Mantis Release Notes

3.5.2 BID 10E2 Notes

Updates/Additions

MAN-267: Added new -display <N> command line option for MantisServer. This selects the Nth display for output, going from left to right on the desktop. If multiple displays have their left edge at the same horizontal position, then they are processed in top to bottom order. The top left most display is 1.

MAN-270: Detailer: Added drop down to allow the order that models/effects/spotlights are listed in to be changed between Added/Alphabetical/Cigi ID

MAN-272: igStats plugin: Added ability to pause 8.x stats two seconds after trigger

MAN-273: viXsen: multiple improvements and bug fixes:

- AdvWeather clouds in IR mode now get their intensity set automatically. Cloud temperature setting is now removed from the AdvWeather GUI. This gives much improved seamless integration of clouds in IR scenes.
- AdvWeather clouds now override the viXsen lowest layer override settings when they are enabled, this is required to prevent odd appearance below the clouds
- vixsenSkydome ground and altitude radii are now set automatically at 95% of the far clip plane. The values on the GUI are ignored (they now only apply to OTW sky dome which is almost never used)
- horizon glow on terrain/models in NVG now blends to the average horizon glow color (previously always blended to black which gave a hard edge between the terrain and the atmosphere)
- Fixed horizon glow on atmosphere in NVG was not working if Channels->Layout->Enable Dithering was checked. viXsen will now always internally disable dithering. The assumption is the Quest2 will always be used and the dithering option in Quest2 should be used.
- Fixed issue with atmosphere skirt getting clipped with some combinations of near and far clip ranges
- Now include AdvWeather coverage in viXsen physics processing if cloud shadows are not enabled (only affects NVG).
- Made CDB use Terrain Specular Scale (previously was not getting scaled at all which could lead to very shiny looking terrains in NVG)
- Fixed issue with 3D clouds would not get the correct amount of fogging unless Mantis General Visibility haze model was used. Also cloud visibility would not get affected by precipitation.

MAN-274: CDB - Added Max Shoreline Height slider that gets used when used Raster Material based water delineation. This forces the terrain to be rendered down to the specified height and only uses the Raster Material value below this height. This fixes issues on TerraVista generated where the Ocean material would often overlap elevated parts of the terrain, which could create large gaps between the terrain and AdvOcean.

MAN-275: RTFoliage plugin - Switched to using alpha to coverage order independent transparency technique. Previously was just using alpha test reference values in which a pixel is either on or off. The new method provides multiple levels of transparency per pixel and looks much better than the previous method with

much less aliasing and scintillation.

MAN-277: Prevented PC from sleeping screen or system while MantisServer is rendering or MantisClient is running.

MAN-278: CDB: Added support for the SpeedTree component of the RTFoliage plugin.

MAN 289: CDB: Added support for RTFoliage grass and ground cover

MAN-292: RTFoliage plugin - added 'Mask GA and CDB T2D' to provide the option on whether to prevent ground cover being rendered to pixels that have either Global Airport pavement and CDB T2D geometry rendered to them.

Deficiencies Addressed

MAN-268: ViXsen plugin - fixed a crash issue that would occur if the view location is ever placed between 88073m and 100000m altitude above sea level.

MAN-269: CDB with viXsen - fixed issue that would cause some sensor textures to not get uploaded to GPU leading to corrupt output on viXsen channels

MAN-271: Fixed issue with continuous position responses causes MantisClient crash when CIGI mode set to standby. To fix this the active position responses are now cleared when a CIGI reset happens.

MAN-276: MnpView: Fixed problem with crashing when viewing tiles containing culture. Problem introduced in Mantis 3.5.0 release.

MAN-282: StaticModels plugin - Fixed issue with objects sometimes culling incorrectly.

MAN-283: Fixed issue with entities sometimes disappearing when attached to another entity. This would happen if the position of the entity being attached was not changed after the Entity Control packet that attached it.

MAN-284: GlobalAirport - Fixed issue that could cause some airports to render perpendicular to the ground. This would happen if a runway was defined twice in the .rwe file. This issue was introduced in Mantis 3.5.1.
Fixed issue some airports disappearing under terrain with CDB terrains. This would happen more commonly with airports in quatorial or polar regions.

MAN-285: RunwayFX Plugin: fixed issue that could cause obscurant effect to glow at night. Issue introduced in Mantis 3.5.0

MAN-286: AdvWeather plugin: Fixed issue with halos in the clouds appearing around objects that are in front of the clouds. Problem introduced in Mantis 3.5.1 release.

MAN-281: AdvWeather plugin - fixed hard edge effect that was sometimes seen at the join of the high and low LOD regions of the cloud. Issues introduced in 3.5.1.

MAN-229: WildFire plugin - fixed some typos in the tooltips.

MAN-287 CDB: Fixed issue with terrain between latitudes 50 South and 51 South not displaying correctly

MAN-279: Fixed very occasional crash issue when paging terrains on Sensor channels.

MAN-288 CDB: Fixed the following issues:
- If View is located at exact power of two divisions of a degree in longitude then some terrain tiles would disappear (e.g. at 41.0, 41.5, 41.25, 41.125 etc.
- long strips of "land" would be present at some locations in the ocean at the edge of where tiles are defined in the terrain database.
- At the border between zones (e.g. 50 deg North) the terrain vertices just south of the junction could flicker up and down as the view moved.
- Fixed MantisServer crash issue in some culturally dense terrain regions.
- Fixed some erroneous warning messages of the form "XXXX read failed from class" where XXXX could be APID, RWID or similar.
- Eliminated spamming warning messages caused if CDB terrain contains point feature references to models at a higher LOD than the reference. This violates the CDB specification, but it seems some TerraVista generated terrains do this. Replaced spamming messages with a single warning message the first time the problem is encountered.

MAN-291: Aircraft Arresting Wire (AAW) plugin - Fixed issue where wire would be invisible if a texture was defined for it.

MAN-293: Fixed issue with bad polygons appearing in T2D geometry at the point where it crosses a geocell boundary.

MAN-294: CDB: Fixed issue with culling of point features sometimes operating incorrectly. This would happen if the view moved away from a particular location and then later returned to the same location. Sometimes point features would then cull incorrectly leading to them disappearing when viewed from certain angles.

MAN-295: CDB: Fixed the following issues with Light Group ID's"
- All taxiway lights were being assigned Light Group ID 15000. There should be different Light Group ID's for blue, yellow, green and red taxiway lights
- If a runway light was not assigned a runway ID (RWID) attribute then it resulted in a bad light group ID being assigned. Fixed so that in such cases the Light Group ID for Runway 01L is now assigned.

MAN-296: Fixed issue introduced in 3.5.0 with a discontinuity between channels of the AdvWeather clouds and Rotorwash effects.

MAN-297: CDB: Improved the way terrain skin surface normals are computed for mission function queries. The old method just returned the same normal that is used for lighting the terrain at the intersection location. On rugged terrain this can differ greatly from the actual face normal. This caused problems with AutonomousTraffic terrain following algorithm, and could cause problems with other similar Host code. Now changed to compute the actual face normal at the intersection location.

MAN-298: viXsen: Fixed issue with sensor texture read failure warning messages being duplicated. Each time a model with a missing sensor texture is loaded a warning message for every previous missing sensor texture was being generated.

MAN-299: Fixed issue with T2D geometry being assigned incorrect sensor material. Now is SMC is concrete then a concrete material is assigned - otherwise an asphalt material is assigned.

3.5.1 BID 10E1 Notes

Updates/Additions

MAN-247: Added new Dynamic Anti-Aliasing Load Management feature. This feature will automatically switch rendering between two different levels of anti-aliasing based on scene load. Note this feature does not work if a ViewportFX or Quest2 is enabled on the channel.

MAN-248: Added CIGI Short Component Control to support dynamic control of the render window position, size and draw order. This functionality is targeted at supporting PIP requirements for mixed sensor channels.

MAN-252: Added support for using RunwayFX plugin effects on T2DModel geometry in CDB terrains.

MAN-253: Made the Channels->Params->Monitor refresh rate able to be set different per sync group.
Also re-arranged the Channels->Params tab to make it clearer which settings were per sync group and which settings are global.

MAN-254: Added support for HAT/HOT/LOS testing against T2D Models in CDB terrains. Only T2D geometry that has an SMC assigned to it using the Q3dSmcTextures.txt method will be tested against.

MAN-255: Global Airport Plugin - Implemented ability to tilt the flat plane of each airport to best fit the runway threshold elevations. The runway threshold elevation data is sourced from the new file plugins/GlbalAirport/RunwayElevations.rwe, so the GlobalAirport plugin data version 1.5 or later is required for this to work.

MAN-256: WildFire plugin:
-Fixed issue with the flames not being doused for long enough when a water/foam drop is made
-Made retardant drops also douse the flames in a similar manner to water/foam drops
-Added environment variables to allow user tuning of the douse times

MAN-257: AdvWeather plugin new features and fixes:
- Added support for second volumetric cloud layer. Re-arranged GUI to group per layer and global parameters separately.
- Added Presets drop down to allow quick selection of sample parameters to achieve different cloud types and coverage levels.
- Allowed coverage level to be set above 1.0 without the anomalies that were seen previously. This makes it possible to gradually change from 0 coverage to 100% coverage when using a WeatherPattern texture. When using a WeatherPattern texture a coverage of 2.0 corresponds to 100% coverage.
- Improved transition from high LOD to low LOD volumetric cloud layer regions
- Significantly reduced striations effect in low level of detail clouds which now makes thicker cloud layers look much better.
- Fixed clouds becoming very transparent during twilight hours
- Fixed illumination being too strong during twilight when no moon is up.

MAN-259: AdvWeather plugin: Added ability to use the standard CIGI Weather Control packet to modify volumetric cloud layers. This should make it much easier for the Host to set the cloud appearance in most cases.

Modified the MUT View->Weather dialog to add a Cloud Type drop down (select between cumulus, cirrus, stratus, etc. cloud types), and made the coverage parameter a slider rather than drop down.

MAN-260: Added the ability to select the sense of the wind directions used in Mantis. This is provided by a new From and To radio buttons next to the Environment->Atmosphere->Wind Direction field.

MAN-261: CDB plugin - added a Max Network Bandwidth control to provide throttling on the rate that data is broadcast over the network. It has been found that on large multi-IGR IG's that using too much network bandwidth impacts the IG network traffic, resulting in DataSync spikes, which causes stuttering.

MAN-264: CigiCCL plugin - added option to set Time To Live (TTL) for UDP Multicast messages set up on the CigiCCL->Commo->Sync tab

MAN-266: Linux version - added the following command line tools: cgLicense.lnx (which will display the license info on the dongle) and CigiUtilsCCL.lnx

Deficiencies Addressed

MAN-249: Fixed very occasional MantisServer crash when doing heavy paging. Issue introduced in Mantis 3.5.0.

MAN-250: Changed WildFire plugin IG->Host CIGI packets to use Image Generator Response messages instead of the ComponentControl messages. This is because the ComponentControl messages were getting blocked by the CigiCCL library as they are defined as being Host->IG only, so the messages were not actually getting transmitted.

MAN-251: Fixed the following issues related to .wwd terrains:
- Fixed morphing not working correctly if first listed MNP terrain has less LODs than subsequent MNP terrains
- Fixed failure to complete initialization if the .wwd file has trailing blank lines in it
- Fixed MantisServer crash if using an MNP that has only one LOD in a .wwd file
- Fixed issue where only the number of LODs present in the last MNP terrain loaded would be displayed in any MNP terrain.

MAN-258 Fixed issue with CIGI position request responses returning 0.0 for yaw when the yaw is in the range 180.0 to 360.0

MAN-262: viXsen plugin: Fixed issue that sometimes caused a crash during startup just after the message regarding Creating the ViXsen OpenGL render context is displayed. This crash only happens on 64 bit builds.

MAN-263: CDB Plugin: Fixed issue that could cause sensor RMTexture's to not get uploaded to the GPU. This would happen if the view suddenly jumps a long distance causing the material responses to be recomputed. This would end up with incorrectly rendered terrain skin.

MAN-265: Fixed issue introduced in Mantis 3.3.1. If Screen Blanking is enabled in the mpf file then Advanced Light Point Processing would not be activated even though it is enabled in the mpf.

3.5.0 BID 10E0 Notes

CDB Implementation changes

MAN-237 - Fixed problem with the Light Group ID's for runway ID's being incorrect, previously the Light Group ID for, e.g. Runway 02 would be given the ID's for runway 01.

MAN-232 - Improved the mechanism for determining the SMC code of mission function intersections with the terrain skin.

Previously 10 was always returned.

Now, if Raster Material method is selected for water delineation then inland water will return 6, ocean will not intersect (which will then fall through to do an intersection against the AdvancedOcean.

If not inland water or ocean, then the OTW texture color at the intersection location is determined and used to approximate the SMC based on color.

MAN-228 - Fixed a problem which could cause LOS queries to report an erroneous result in some cases when using a CDB terrain.

MAN-226 1) For powerline networks and GT Point Features at LOD levels 5 and below, if the LOD does not exist it is now created by searching down the lower LODs until a the feature is found. The LOD level is then created by clipping out just the points in that lower LOD that are in the region of the higher LOD level.
This is to fix an issue with TerraVista generated terrains. TerraVista would stop creating higher LOD tiles for a region if there were less than the maximum allowed point features in the current level. For LODs >= 0 this is 16384. So a tile could have up to 16384 references to a complex GT model. This would cause performance issues, or in extreme cases a crash due to the huge amount of data generated when the references were flattened.
With the new method, better LODing of these features results.
2) For T2D models the RTP now checks for the highest LOD of elevation data that is present in the region of the T2D model. The T2D model will now not be sliced up any finer than the underlying elevation LOD. Previously it always sliced T2D down to the level specified for the Max Elevation LOD on the GUI which could generate an excessive number of polygons.

MAN-225 - Fixed a problem with generating powerline networks from TerraVista generated CDB terrains which meant that most of the pylons were not created.

MAN-221 - Added Imagery Gamma Correction slider to allow the imagery to have gamma correction applied as it is paged in.

MAN-219 - Added new controls for Render Enables and Minimum Significant Size

MAN-214 - Added support for inland water in CDB terrains to generate reflections of the generic reflection map that is selected in AdvOcean plugin.

MAN-203 - Made powerline segments be rendered at the highest LOD present for the region. Previously powerlines would only be rendered at the LOD specified as the highest powerline LOD on the plugins GUI page. But some terrains may have the pwerlines represented only up to a lower LOD in some regions compared to others. With this new change, the powerlines will get rendered in all regions - not just those regions where the max powerline LOD is present.

MAN-201 - Fixed issue where the rendered terrain would correlate badly to HAT/HOT/LOS queries on terrain tiles with high longitudes (~less than -140 deg or greater than 140 deg). This also caused point features to not conform correctly to the terrain surface.
Also fixed issue with geospecific point features not conforming correctly to terrain if the tile has higher LOD elevation data than the highest LOD of the point feature.

MAN-240 - Fixed the following two issues with CDB:
-Sometimes point feature geometry would disappear when the view is close to it.
-Sometimes, when multiple MantisServers are running on the same PC, the terrain would appear black and at zero attitude, or other similar corruption, on some of the channels.

Fixed issue with ocean height being returned for HAT/HOT's if terrain is at elevation 0.0. Now if raster materials are being used for water delineation then the height will be ignored when determining where the ocean is fir HAT/HOT queries.

Allow pylons to use "Attach Point" in addition to the correct "Attach_Point" to denote cable attachment points. Lithos seems to use the incorrect naming.

Fixed issue with T2D geometry displaying incorrectly if it is not in the same geocell as the view position.

When loading flt models now check vertex palette for identical vertices and remove duplicates. The reduces memory footprint of most TeraVista generated models by up to 50% as TeraVista seems very lazy about the way it constructs the vertex palette and doesn't check for shared vertices.

For point features that have a normal pointing straight up, added a randomization to the direction of the normal. This is to make trees have some each have some intensity variation which makes forests look much more naturalistic.

Fixed issue with light points in negative LOD's not being rendered when there are no light points in LOD 0 but there are areal or lineal GS features at LOD 0.

Fixed terrain LOD scaling to not be dependant on the channel resolution. This caused no culture to be displayed when window was set small.

Fixed issue with GS models not getting rendered when GT models only exist at low LOD's

Fixed issue with GT models that only exist at low lod's not conforming very well to the terrain.

Updates/Additions

MAN-193 - Added new OpenVR plugin to support VR/AR HMD's that have an OpenVR plugin. This currently includes HTC Vive, HTC Vive Pro, Oculus Rift, Metavision Meta 2. Testing has only been performed on HTC Vive Pro.

MAN-209 - Created new WildFire plug-in for simulation of firefighting of wildfires

MAN-234 - Made the haze skirt rendered on the skydome get smaller based on the altitude of the view. At sea level it is now extends up to 40deg, this reduces linearly down to 10deg as the view point altitude increases up to 10000m. Previously it extended to 40 deg at all view altitudes.

MAN-233 - Removed requirement for .cch files on MNP terrains.

Modern GPU's only generate render glitches (frame overruns) when creating textures and VBOs if a texture or VBO is deleted from the GPU. This is perhaps due to some kind of garbage collection occuring in the driver.

So now in Mantis, for both MNP and CDB terrains, the VBO and texture cache is always enabled (previoulsy the VBO cache was only enabled if there was a .cch file present). both caches are initialized with no entries (previously they were primed from the .cch file) but allowed to grow as required. With the cache enabled, VBO's and textures never get removed from the GPU once created. Instead, if they become free they are just flagged as available for reuse, and then reused when a similar size/format texture or VBO is subsequently required.

MAN 231 - Replaced the white noise texture used for texel feathering with a modified version of the rock-fine-detail texture that has been widely used previously as a detail texture. If texel feathering noise level is not 0 then any use of rock-fine-detail detail texture in existing terrains is disabled allowing the texel feathering implementation to be used instead. This has the following advantages:
- The texel feathering noise has no net change on the intensity of the image. For backwards compatibility reasons, the old detail texture method could only darken the image, which resulted in a net darkening of the terrain. This results in popping a patchy appearance to the terrain if paging cannot keep up with motion.
- The texel feathering noise is much more stable. That is it does not judder around as the view moves like the old detail texture would due to float precision errors.

MAN-227 - Added support for particle effects to use a sensor temperature instead of requiring a .mcm version of the base texture. There are now new Sensor options in Detailer on the Particle and Sparks effect tabs. This option must be used when using the built in animated smoke texture. If using the base texture it is optional.
A benefit of using the fixed temperature method is that the particle effects shader can be used even on ViXsen sensor channels, which speeds up rendering on these channels.

MAN-223 - Added support for the alpha value in the CIGI EntityControl and AnimationControl packets when using effects. Previously the alpha value only worked for entities and was ignored for effects.

MAN-220 - Changed the way wind is controlled in particle effects.
Previously wind was defined as a vector table entry, but was completely overridden by the Mantis computed wind vector if the wind speed in Mantis was not 0. This is a very confusing way of doing things and does not allow any flexibility in creating effects that do not drift at the full wind speed all the time.
In this change the table entry was changed to a scaler value. This value scales the wind vector computed in Mantis. This allows effects to be created that do not drift at the full wind speed, or change the way they drift during the life of each particle (e.g. retardant drop starts out clumpy but then becomes an aerosol).
The property name in the .scd file was changed so that any existing effect that had a wind entry would have those properties values ignored and would default to wind scale of 1.0 for the life of the particle (effectively what would have happened anyway with a non-zero wind speed in Mantis).

MAN-218 - ViewportFX plug-in:
-Upgraded all sample shaders to use GISL shading language (they were all using Cg).
-Modified shaders to use GL_TEXTURE_2D texture for off screen framebuffer (were previously using GL_TEXTURE_RECTANGLE) to make them compatible with recent changes in the Mantis internals.

MAN-216 - AdvOcean: Added support for new wake types.
The old Bow wake now appears as Stern x1, the old Stern wake now appears as Stern x4.
An aircraft wake type is added that is the same as Stern x4 except it does not automatically back form when it is first created, this allows it to be used for aircraft landing or skimming on the ocean.
Inland water versions of all of the above were also added. The inland water version does not conform to the ocean and does not use the stencil buffer to only render where there is underlying ocean.

MAN-213 - ViewportFX plug-in - Increased the number of shader parameters that are settable from the host via CIGI from three pairs to ten pairs.

MAN-210 - Added support for entity relative coordinate system for LOS segment start and/or end points. This is part of the CIGI standard for the LOS Segment request that was not supported until now.

MAN-207 - Added Half Pixel Offset checkbox to Channels->Layout tab. This applies a half pixel diagonal offset to the view frustum when checked. It may be used to drive the offset half of the channels when using projectors that use e-Shift or Pixel Shift technology.

MAN-204 - Added the following features to the particle effects to support large area fire and smoke effects:
- A 2D array .q3dtd texture description file may now be used for the base texture of particle effects. This serves as a flip book animation for the particle, which will be looped through over the time given by Animation Time.
- new Life variance parameter to allow some particles to have shorter lives.
- Twist and twist rate. If Twist rate is 0.0 then all particles will be oriented at the angle specified by Twist. If Twist Rate is non zero, all particles will start out with a random twist.
- new Annular Distribution to cause particles to be spawned only near the perimeter of the region defined by Src Radius.
- new Texture Method dropdown allows choice between using base texture or a built in animated smoke texture.

MAN-202 - In Mantis 3.4.1 the localized lights were modified such that illumination intensity falls off proportional to range * range, was previously proportion to range (see MAN-137). This can mean that the lights now appear dimmer. To compensate for this for older hosts, the MANTIS_LOCAL_LIGHT_RANGE_SCALE environment variable can now be used to scale the light range by the factor specified by the environment variable.
e.g. set MANTIS_LOCAL_LIGHT_RANGE_SCALE=2.0
would scale all local light ranges by 2.0

MAN-238 - Re-added the max data rate setting on the CacheFileServer plugin. This setting sets the approximate maximum rate that paging data will be broadcast over the network. Without this throttling severe performance problems and CFS errors were getting generated on a system under test.
MAN-242 - Added a second Unthrottled Max Data Rate setting to CachedFileServer. Made the CachedFileServer automatically switch between throttled and unthrottled rates whenever Mantis switches between throttled and unthrottled paging.

Added new 8.4 stats level which just shows the time based stats and no quantity based stats.
Made 8.2 stats have different colors for each plot and not show the ms lines grid.
Removed the Texture usage stats as these don't work anymore.

Added Pause check box next to stats settings on General->Graphics tab to allow the 8.x stats logs on all channels to be paused/resumed.

Added support for ARB_bindless_texture OpenGL extension. This boosts performance by 15% to 20%

Updated SpliceTree and MnpView GeometryNode and AGNone properties to display latest flags.

Changed one of the triggers for the igStats plugin from PreSwap to DataSync. The PreSwap was never useful and sometimes it is useful to monitor for DataSync spikes.

Deficiencies Addressed

MAN-235 - Fixed occasional MantisServer startup issue introduced in Mantis 3.4.2. Sometimes the MantisServer would hang after the message regarding force rendering lightpoints.

MAN-230 - Fixed issue with unnecessary and duplicate textures being created when using WWDB terrains. For WWDB's that contain many MNP terrains this can reduce memory consumption on the GPU considerably.
-If more than one MNP terrain use the same texture that is not in a texture array, it is now only loaded once.
-The redundant tileN_XX_YY.dds textures in each MNP file are now not loaded.

MAN-224 - Fixed following issues with effects:
- If an EntityControl for an active effect was received with Attached set but parent entity set to -1, then the effect would become orphaned and persist for ever. In this way over, time, many effects could be orphaned and become a memory/performance issue.
- Attempting to change the parent entity of a wake effect would not work.

MAN-215 - AdvOcean - fixed issue with wakes not conforming correctly with ocean surface. The head of the wake would be at the correct altitude, but the tail would be submerged or elevated by an amount dependent upon the location and orientation of the wake. This could cause the wake close to the view position to disappear when the view is close to water level.

MAN-212 - Fixed issue with ocean clamped entities that are created whilst the animation time is paused (by the host sending the same animation time each frame). The entities would not get clamped to the ocean until time started moving again.

MAN-208 - Fixed issue with the dithering on clouds in the AdvWeather plugin causing a dim ring to be visible around the edge of the clouds on dark moonless nights.

MAN-206 - AdvWeather plugin. Fixed an issue where there could be a sharp transition in the fogging on an aircraft when flying in close formation inside the cloud layer, such as in a boom operator trainer.

MAN-205 - AdvWeather - fixed issue when using high bit precision rendering with small values of Hi LOD Delta (less than 30). It was possible for the alpha value to overflow which would cause ugly scintillating holes in the low LOD section of the cloud layer.

MAN-244 - Fixed issue with light points appearing extremely faint if an antialiasing mode that uses super-sample antialiasing is used. On the NVIDIA driver this currently happens when using 16xAA or higher. The NVIDIA driver renders the points the size of the SS sub-samples. There seems to be no way to determine the level of SS automatically so Mantis assumes 16x or 32x AA will have 4xSS (2x2), and 64x AA will have 16xSS (4x4). The light points are then scaled in size by 2x or 4x respectively. If the NVIDIA driver

changes and these settings are no longer correct, the MANTIS_LIGHTPOINT_SCALE env var can be used to override the scale, eg set MANTIS_LIGHTPOINT_SCALE=2.0

Fixed issue in Detailer when importing effects. Previously an imported effect may show an incorrect CIGI ID on the CIGI tab (typically a duplicate of some other effects ID), and the .scd file would not contain a CIGI ID for the effect.

CigiUtilsCCL - Made dumps of CIGI3+ logs have 10 decimal places of precision for lat/long values (this was already being done for CIGI 2.0 logs).

3.4.2 BID 10DD Notes

CDB Implementation changes

MAN-166 - Added support for T2D components of terrain.
- Improved algorithm used to determine which levels of details of a GT Model Geometry are required at a particular GTFeature LOD. This significantly reduces page time and memory requirements for some terrains (e.g. Yemen 3.2 sample)

MAN-168 - Added support for using raster material (RMTexture) to delineate regions of ocean and inland water.
- Fixed problem in sensor mode with occasional terrain skin tiles not appearing correct after startup.
- Added command line options to MantisCdbRtp to allow the position and size of the window to be specified.

MAN-169 -Added Elevation Lod Scale slider to allow increased terrain elevation resolution and less noticeable morphing on more rugged terrains.
-Fixed issue with terrain skin texture tiles popping to a blurrier version of the texture as the view gets closer.
-Made subordinate textures (skid marks, contaminant textures etc.) get rendered with true alpha blending, previously was using alpha to coverage which only allowed as many levels of transparency as there ere sub-pixels of antialiasing.
-Change fade range of point features to be 15% of the LOD range (was 10%) for smoother fades.
-Fixed issues with transparent polygons (e.g. skid marks) not transitioning correctly between LODs.

MAN-172 Added support for Quantum3D/Q3dGlideSlopes.txt file to allow specification of glide slope angle for PAPI or VASI of select runway approaches.

MAN-175 - Added additional CDB plugin options specifiable in each terrains .cdb file. This allows certain plugin parameters to be automatically set by each terrain when it is loaded.
- Added -logBandwidth command line option to MantisCdbRtp.exe

Updates/Additions

MAN-165 Added ability to enable LOS queries against concrete and asphalt surfaces and buildings on GlobalAirport generated models.

MAN-167 Improved appearance and performance of particle method of rendering precipitation:
-Switched to using VBO instead of immediate mode rendering.
-Increased particle count 3x
-Fixed a few appearance issues.

MAN-171 DiGuy plug-in - When switching actions using the DiGuy Action short component control, previously there were only two choices, complete full cycle of current action then smoothly transition to new action, or switch to new action immediately with no transition. Added new third option to switch to new action immediately but with a transition, a parameter is also added to control how fast the transition is.

MAN-174 Made stealth mode synchronous when CIGI is active and running synchronously. When all the following is true:
-CIGI is active (either from host or playing a log)
-CIGI Frame Control Master is checked
-CIGI VSync tab is set up correctly
-Channels->Params->Datasync is checked
Then the thread that updates the view position in stealth mode will now run synchronously to the display refresh. This results in perfectly smooth stealth motion. Previously the stealth view update always ran asynchronous to the display refresh so movement was somewhat choppy.

MAN-176 Added support for domeprojection.com's new distortion correction library. This is in addition to the old Q3D implemented method for domeprojection.com so that existing systems don't get broken.

MAN-177 Added support for CIGI 4.0 to Mantis, MUT's and CigiUtilsCCL

MAN-179 Migrated all Mantis projects and solutions to use Visual Studio 2017 Compiler/Linker

MAN-183 Added new Channels->Params->Join QuadroSync Swap Barrier checkbox. This allow isolated channels to join the QuadroSync Swap Group but not the swap barrier. This effectively puts these channels in their own local swap group with just the other channels in the same PC, while keeping the video synchronized to all other channels in the IG. When using this feature, these channels should also be placed in a different sync group.

MAN 184 Upgraded Scalable Displays EasyBlend SDK to version 2.9

MAN-186 Added new Channels->Layout->High Dynamic Range checkbox. When checked, 30 bit HDR frame buffer is used, when unchecked 24 bit frame buffer is used. Adding this button required re-arranging the tab to fit it in. This button supercedes the previous MANTIS_24BIT_COLOR environment variable.

MAN-187 -Added new CIGI Short Component Control packet to allow host to dynamically set the frame swap interval.
-Added new CIGI component control to allow some features of the distortion correction to be dynamically controlled from the host.

MAN-188 Added optimization to LOS/HAT/HOT processing code for MNP terrains. This will benefit MNP terrains that make use of texture array optimizations making queries typically 20% to 30% faster. In addition, this change allows terrains built with a future release of Celerity to benefit further, as much as 1000% faster.

Deficiencies Addressed

MAN-142 Fixed sequence of 10 "wglMakeCurrent failed... retrying" warning messages on the MantisClient message log whenever a preview model is added on the stealth tab.

MAN-173 Fixed occasional crash issues when performing LOS queries. It is believed that this issue only affects systems using the Rotorwash plugin or storm clouds in the AdvWeather plugin.

MAN-178 When frame interval is greater than 1, Mantis now waits until it is in the last frame of the specified frame interval before issuing a buffer swap. This is to fix an issue with Windows 10 DWM where it would present the frame to the display at the next VSync rather than waiting until the specified number of VSyncs.

MAN-180 Rotorwash effect was only having the directional light color applied to it. This made the color not blend with the scene lighting at dawn and dusk when the rotorwash lighting would become too saturated. Added ambient lighting into the computation of rotorwash color to fix this.

MAN-181 Made .vt file not get loaded by CFS if it is on the C: drive, which is assumed to be local. This fixes failure to open .vt files that are in the %MantisInstallDir%\cache when %MantisInstallDir% is located on the c: drive.

MAN-185 Fixed erroneous warning message when loading mnp terrains. A warning was being displayed about not being able to load a texture with the texture name being the full path name to the .mnp file.

ZD 20330 Refer to this items previous entry. Changed default MANTIS_SYNC_METHOD to 2 if the environment variable is not present (was 1). This was to fix problems where the DataSync would get out of sync and cause long delays at the start of each frame before rendering would begin, resulting in performance issues.

MnpView -Fixed issues with all textures appearing black.
-Added new No Array Textures list to Mnp Control->General tab. This displays all global textures that were not placed in texture arrays.
-Fixed view reset to generate a north up plan view of the currently selected tile.
-Made zoom to selected region work correctly (previously only worked if selecting Geometry or Light Point nodes, and didn't work at all for anything in LOD level 0).

3.4.1 BID 10DC Notes

CDB Implementation changes

The following updates to the Common Database (CDB) terrain format support:

- Added support for using CDB terrains on viXsen sensor channels. This includes the following changes:
  - Implemented support for terrain skin RMTexture material textures
  - Added sensor support for point features. Implemention is limited to per polygon material assignment for point features.
  - Added support for light maps and terrain city glow on Sensor channels (this only works on CDB terrains).
- Added support for runway contaminant subordinate textures, including switching between textures via GUI or CIGI
- Added support for Detail/Micro/Macro and skidmark subordinate textures

- Added reload button and CIGI packet that reloads the terrain. This can be used when time of year is changed and alternate textures are provided for the new time of year. These alternate textures will not get applied to already loaded parts of the terrain unless the reload is activated.
- Switching between terrains at run-time is now supported.
- Added support for HAT/HOT/LOS and collision segment testing against terrain point features (e.g. buildings, trees, cut in airfields, etc.)
- Added support for wirestrike collision detection between entity collision volumes and powerlines in CDB terrains.
- Added support for seasonal textures for terrain skin imagery and GTModelTextures.
- Fixed issue with terrain texture scintillation.
- Added support for use of RunwayFX plugin with CDB terrains.
- Added support for use of Rotorwash plugin with CDB terrains.

Updates/Additions

MAN-136 Modified Mantis so that it will still start up and run when one or more .vt models referenced from the .scd file are not found. The empty.vt model is used instead for such entities.

MAN-137 Changed spotlight implementation to fade with range using a square law. Previously this was linear. This matches real spotlights which fade proportional to range squared.

MAN-140 Added support for ViXsen Sensor channels to RunwayFX plugin.

MAN-140 Fixed issue which has always existed where light points would not be fogged according to viXsen Haze Model on sensor channels.

MAN-143 Previously halos in viXsen were rendered using completely different code to the halos rendered when doing NVG Stimulation.
The render method used for the NVG Stimulation halos is much faster and more efficient make use of more modern techniques. They also look more realistic.
Now the viXsen halo rendering has been switched to use the same code path as the NVG stimulation halos.
This may require some re-adjusting of the halo parameters if upgrading to this version of Mantis to get the best appearance.
As part of this change the halo appearance and performance in general has also been improved. The GUI text has also been changed to improve clarity on what each control is configuring.
The ability to select moon rendering between light point and quad has been deprecated. The moon is now always rendered as a haloed light point when halos are enabled on a channel.

MAN-147 Added dropdown on viXsen->Sensor tab to allow manual selection between using JRM and Quantum3D sensor physics processing libraries.

MAN-155 Added check box on General->Graphics tab that when checked (the default) will cause the vertex position transformation by the ModelView matrix in the vertex shaders to be performed at double precision (64bit floats) instead of single precision (32 bit floats).

MAN-XXX Increased resolution of LightPoint texture to improve appearance.
Increased ambient light level when sun is below 15 degrees elevation as winter scenes were appearing too dark.
Modified RunwayFX light point reflections have some dynamic shimmer when the view point moves.

MAN-158 Added CIGI control for viXsen Lowest Layer Override controls

MAN-162 Ported to using Suse Linux Enterprise Server 12 SP3 as the standard supported Linux platform.

Deficiencies Addressed

MAN-5 Fixed issue with ViXsen halos appearing darker than the surrounding scene when the moon is out.

MAN-6 Fixed issue with certain combinations of the ViXsen Sensor shader failing to compile.

MAN-131 Made autonomous traffic plugin check tags to make sure inland waterway is navigable. Only navigable stretches of water will have boats placed on them.

MAN-132 Fixed issue introduced in Mantis 3.3.2 where entities that are ocean clamped would have their attitude and altitude reset each time an EntityControl packet was received for the entity

MAN-134 Fixed problem with a VC++ Runtime Abnormal Termination dialog being generated sometimes by the Autonomous Traffic plugin. This would occur if fetching OSM data is enabled and the length of a received data block is longer than any previously received data block, and it's lebgth is an exact multiple of the memory allocation routines block size.

MAN-135 For models set as un-clamped in the .scd file, fixed issue with entities not moving correctly after the host has enabled either non-conformal or conformal clamping for the entity via the CIGI EntityControl packet.

MAN-144 Fixed issue with AdvOcean clamping and HAT/HOT queries over ocean not correlating correctly with the waves on the ocean surface if the Latitude of Interest is not set to 0.0.

MAN-160 Fixed problem with collision segment testing not working on objects added to the scene by the StaticModels plugin.

MAN 161 Fixed problem with volume collision detection not working as it should according to CIGI specification.
Previously, all entities that had the Collision Detection Enable (CDE) bit of the Entity Control Packet set were tested against all other entities that had the CDE bit set. But the CDE bit is also used to enable Collision Segment detection for the model, so you don't want to have to enable this for all entities in the scene as performance issues may result.

The correct behavior is that any entity that has CDE bit set should be tested against all other entities that have Bounding Volumes defined and their collidable masks have any matching bits. That way CDE typically need only be set for the ownship. A model can be excluded from having any collision volume testing performed against it by setting the Collidable Mask to 0.

MAN-163 Fixed issue with MantisER installer failing on some non-English Windows installations.

3.4.0 BID 10DB Notes

Updates/Additions

2. Native support for direct loading of terrain databases in Common Database (CDB) format. See *CdbPlugin* section of *Mantis Plugins User Manual for details*.

3. New *StaticModels* plugin provides a mechanism to efficiently populate the terrain with a set of modelled features. E.g. this allows new tall constructions (such as buildings, wind-turbines, radio towers) to be added to the terrain without having to re-generate the complete terrain, allowing the terrain to be kept up to date with the real world.

4. Watercraft capability added to Autonomous Traffic plug-in.

ZD 20306 Added support for NodeNamesToNotRender.txt in mnp folder. This may contain a list of node names. These nodes will be removed from the scene graph so will not get rendered or be used for mission functions. This can be used to prevent specific bad geometry from being rendered without having to rebuild the whole terrain.

ZD 20314 Modified CIGI Moon Elevation and Phase Query short component control packet to also return moon azimuth, sun elevation and sun azimuth.

ZD 20320 Added new Clear Day environment map to RunwayFX and AdvOcean plug-ins. These have much reduced cloud intensity compared to the Sunny Day environment maps. Re-named existing "Sunny Day" environment maps to "Partly Sunny Day"

ZD 20339 Added additional monitor refresh values to the Channels->Params tab

ZD 20355 Added new CIGI Short Component Control packet to allow host to request the current Terrain Paging Status (i.e. whether or not terrain paging is currently throttled or free running).

ZD 20362 Added support for reading HMD or VR/AR goggles tracking in CustomSymbology plugin.

ZD 20361 Added Spotlight intensity scale factor slider to MantisClient->Environment->NVG Stimulation tab.

Deficiencies Addressed

ZD 20304 Fixed issue introduced in 3.3.2 release that caused 2D clouds to appear opaque.

ZD 20305 Fixed issue with the CIGI short component control packet that sets the animation time not working if there is more than one sync group active.

ZD 20307 Fixed issue with CIGI short component control Set Animation Time also setting the Auto Airport Lighting parameters

ZD 20313 Removed limit on maximum value of near clip plane (was previously limited to 10.0 or less) when using CigiCCL plugin (CigiV2 never had this limit)

ZD 20316 Fixed following issues that occur when host is controlling animation time:
1) If animation time jumps backwards then any rotorwash effects will stop rendering
2) Erratic DiGuy behavior and very long render thread freezes when setting actions.

ZD 20317 Fixed issues with some time dependent CIGI controls such as rate control not working correctly when host is supplying the animation time.

ZD 20319 Fixed issue in AdvancedWeather plugin where Cloud City Glow would not be visible on the high LOD 3D clouds if a storm cloud is within the field of view.

ZD 20321 Fixed issue with insets on Alaska/West Canada region of wwdb not suppressing the rendering of the underlying background terrain - so both inset and background would be rendered.

ZD 20325 Made DiGuy use sample coverage alpha for semi-transparent geometry. This fixes an issue with semi-transparent geometry not being visible at all for DiGuy characters.

ZD 20326 Fixed issue with HOT requests always failing when using igCigiV2 plug-in since Mantis version 3.3.1

ZD 20330 Reverted the default datasync behavior back to how it used to be prior to RN 130201-000002. It was found that the new datasync behavior implemented in that change results in an additional frame of latency being introduced.

With this change the new behavior can be selected by setting the environment variable MANTIS_SYNC_METHOD to 2. This should only be done on systems that experience the long DataSync delays (the pale green line on the 8.1 stats).

ZD 20345 Updated the NVIDIA GLCache priming mechanism to prime the cache from both %appdata%\..\Roaming and %appdata%\..\Local. Previously only primed the cache from %appdata%\..\Roaming.
Newer NVIDIA drivers (approximately 388 and later) have switched to using Local rather than Roaming to store the cache.

ZD 20353 Fixed issue with short component control that enables/disables NVG Stimulation for a channel not working.

ZD 20354 Fixed issue introduced in 3.3.0 where in cloud fogging inside 2D cloud layers was not working on ViXsen sensor channels.

ZD 20358 Fixed issue when using the TestPattern plugin Texture Test Pattern. It was erroneously affecting the properties of other textures in the scene.

ZD 20360 Modified the way special matrices driven by the wind are computed. Previously if the wind speed changed even slightly the position of the matrix would jump randomly. With the new method the positions behave correctly as the wind is changed.

ZD 20363 Fixed following issues when Host pauses or moves back animation time:
- Bow spray blooms up for a short period after time is paused (actually caused since the ocean clamping physics continued to move the ship).
- Wakes would zig-zag and overlay itself if time was moved backwards. Now the wake is reset in these circumstances.

3.3.2 BID 10D8 Notes

Updates/Additions

ZD 20177 Made precipitation effect (rain/snow etc.) get illuminated by any spot lights or fog lights that are near the view position.

ZD 20005 Added support to VTree scene graph for items such as windsocks, wind turbines, and weather vanes. A DTNode can now be flagged to use a special matrix, along with a matrix index. The index determines the type according to the vtScene::SpecialMatrices enum. These special matrices are updated each frame to perform the required action.

OpenFlight2VTree has a new DOF node comment vt_special_matrix=<MatrixID>

to use one of these matrices instead of the normal DOF matrix.

ZD 20178 Made ShadowSwitch mechanism easier to use. A single switch node named ShadowSwitch may now be placed anywhere in an entities scene graph. The switch node must have exactly two children. The first child is traversed when rendering the visual scene, the second child is traversed when rendering to the shadow map.

Also removed the restriction that the ShadowSwitch node mechanism would only operate on entities that were not shadow receivers.

ZD 20188 Added support for using Texture Arrays in MNP files. This effectively allows multiple textures to be accessed from within a single draw call which allows a drastic reduction in the number of draw calls - which improves performance.

ZD 20200 Added support for using file called TexturesToIgnoreForAllMF.txt to indicate which nodes to ignore completely for all mission function queries.
Old filename called 3dTexturesThatIdentifyNodesThatClampingShouldIgnore.txt can now use the slightly less long TexturesToIgnoreForNearVerticalMF.txt instead.

ZD 20203 Added capability for a separate process to interface to Quest2 and grab the frame buffer after blur and noise have been applied but before other post processing. A new ImageGrabAPI library has been created that the other process can use to perform this task.

ZD 20216 Added option to GlobalAirport Plug-in GUI to disable rendering the base generic textured polygon for all airfields. This might be desired if all training areas have high resolution terrain texture.

ZD 20197 Added support for using texture arrays for terrain global textures. This can greatly improve performance when terrains contain dense culture which uses many different textures (e.g. buildings). Also greatly reduced the overhead of switching back and forth between geometry that has lights maps and geometry that does not.

ZD 20223 Made following enhancements to GlobalAirport Plugin:
- Support for version 10.50 of X-Plane apt.dat (support airport codes > 4 characters)
- Added support for heliports

ZD 20225 Added display of Exclusion Zones in magenta on Autonomous Traffic debug map display.
Added ability to pan and zoom the debug map display.

ZD 20226 Added ability to have seasonal global textures in the terrain, e.g. for trees. This is achieved by looking for global textures in the wwd folder first before loading the embedded texture. So creating multiple folders, each containing a wwd and the seasonal version of the textures, allows selection between different global textures.

ZD 20229 Added checkbox to GlobalAirport plug-in to disable terrain flattening

ZD 20233 Added the ability to set the vertical size of the Quest2 temporal noise via CIGI

ZD 20234 Added additional memory usage stats to the 3.2 stats display.

ZD 20236 Added support for the following new OpenFlight comments: vt_vertical, vt_powerline, vt_culture, vt_night_or_low_vis, vt_no_isect

ZD 20237 Added new option to send an additional multicast packet each time a CIGI start of frame is sent. This can be used for sychronizing other components of the system in addition to the host.

ZD 20238 Made Atmosphere->Sky->Calib slider affect layered fog ranges (previously only affected general visibility).
Added new CIGI packet to allow the Atmosphere->Sky->Calib value to be adjusted on individual channels. This allows, for example, visibility to increased on channels that are simulating a sensor that uses wavelengths that penetrate fog more than visible light.

ZD 20239 Added support for per light point direction. Previously if an OpenFlight Light point node contained points with different direction vectors they would all end up with the same direction.
Updated Global Airport plugin to make all runway and taxiway center lights directional.
Changed light point glare texture to look a little better.
Changed default Atmosphere->MinPixelSize to 2.5 (was 3.5)

ZD 20242 Global Airport improvements:
- Signage now has depth
- PAPI/VASI/Wig-Wag now have polygonal box behind them
- Added lighting to heliports that are flagged as having lighting.
- Set min pixel size of PAPI/VASI to 3.5 to keep them visible when using lower global min-pixel size.
- Adjusted the power and size of some lights to make them more consistent.

ZD 20251 Modified AdvWeather volumetric cloud layer and storm clouds to allow illumination by colored light sources - previously spotlights would always illuminate clouds white, fog lights would not illuminate clouds at all.

ZD 20252 Added ability to also apply modulation with a gaussian noise pattern when applying texel feathering.

ZD 20253 Improved RunwayFX blowing sand/snow by making it move in the direction of the wind.

ZD 20255 GlobalAirport plug-in: Added ability to define multiple flatten circles in the .kml file for an airport. This allows avoiding flattening, for example, a prominent hill/valley adjacent to the airport,

ZD 20256 Added sliders to NVG stimulation tab to allow control of how much each of the following lighting types are boosted on NVG stimulation channels: Fog illumination by spotlights and fog lights; Terrain City Glow; Cloud City Glow; Light Maps.

ZD 20257 When vol cloud depth buffering is enabled, limited slicing of vol cloud layer at entity ranges to only be done for the 4 closest entities that are inside the cloud layer. This reduces rendering load when, for example, using vol cloud layer as ground fog and there are many vehicles driving around the terrain.

ZD 20266 Added new MantisServer command line option -monitorID <N>. This works similarly to -displayID <N> option except that <N> is the same number as is displayed on the monitor when Detect is pressed on the Windows Screen Resolution control panel. This should make figuring out the correct value to use much simpler.

ZD 20268 Added new Cigi controls to allow host to control how much rotorwash, precipitation, and fog is illuminated by spotlights and fog lights.

ZD 20269 Made .vt model files from .scd file and AutoTraffic get loaded via the CachedFileServer if CFS is enabled. This should improve startup time on systems with many channels that load many models and use CSA.

ZD 20272 Autonomous Traffic improvements and bug fixes:
- Added vehicle speed scale slider
- Added Allow Vehicels On... check boxes
- Fixed issue with vehicles intersecting when a long vehicle is behind a short vehicle.
- Fixed issue with vehicle clamping queries not getting distributed evenly between all MantisServers

ZD 20292 Added capability for order independent transparency using the GL_SAMPLE_ALPHA_TO_COVERAGE method. This makes things like trees look significantly better and eliminates visual aliasing and flashing.

Rendering performance is also improved since geometry with this enabled only gets rendered on the first pass of two pass transparency.

By default any texture whose name contains tree, pylon, or _oit (order independent transparency) will have the feature enabled.

Some geometry does not look good with it enabled - such as high contrast alpha like fake light cones. The dithering and banding becomes very eveident on these. That is why this feature is only enabled on select geometry.

ZD 20298 OpenFlight2VTree - added ability to use Group and Object node Priority parameter in Creator to control polygon offset. Each increment in priority will offset all polys below it by a corresponding amount. This is used to fix z-fighting of co-planar polygons. The old sub-face method still works but this new way is more flexible.
Also fixed problem with old sub-face method that meant it would not work for multiple sub-face layers if floting point depth buffer is enabled.

Deficiencies Addressed

RN 160920-000000 When in NVG Stimulation mode:
- made moon appear as a large halo rather than normal OTW appearance.

- Made AdvWeather clouds on moonless nights be lit from above by the starlight.

ZD 20003: Fixed problem with RunwayFX shader performing old morphing method so would render slightly different to actual geometry. This made regions of the RunwayFX disapear when applied to morphing terrain.

ZD 20004: Improved robustness of Autonomous Traffic plug-in:
- Better checks on failure to connect to OSM server. Fixed crash when using an incorrect server.
- No-longer save tiles with no nodes to local cache. This prevents caching of tiles that contain incorrect data as they are outside the region imported into the OSM server.
- Fixed crash if no vehicle models defined in vehicle file.

RN 080421-000000 Fixed wind direction control in CigiV2 plugin. Wind direction was being erroneously converted to PI/180 of what it should be.

ZD 21058 Modified fade LOD to fade in using a square law rather than linearly. This gives a less noticeable fade in transition. This change was also applied to Autonomous Traffic plug-in vehicle fade in.

ZD 20159 Fixed bug introduced in 3.2.0 where 4 fog lights were always enabled but placed at 0,0,0 so wouldn't illuminate anything. This caused rotorwash to glow at night. Also fixed rotorwash to get illuminated by fog lights and lightning, which never happened before.

ZD 20004 Fixed crash if Mantis is started with AutonoumousTraffic disabled. Improved re-population of an area with vehicles when AutonomousTraffic is enabled or the eye point suddenly moves to a new area.

ZD 20168 Fixed issue introduced in 3.3.1 release where entities would fall through terrain when clamping was enabled.

ZD 20169 Fixed a flicker that would occur when fade LOD was happening. Nodes would fade down to 0.04% alpha then flicker back up to 0.08% alpha before fading away completely.
Also improved performance of fade LOD. Previously each node was rendered with two draw calls while in the fade transition. Now only one is used unless the node contains alpha texture.

ZD 20175 Fixed issue with entities cast shadows casting alpha textures as completely solid. During shadow map rendering entities were rendered with the alpha test threshold set to the value set in Detailer in the model properties tab. This defaults to 0.0 and is typically not changed. Modified code to ignore this value when rendering to shadow map and instead use a hard coded value of 0.5, so only pixels whose alpha is > 0.5 will now cast a shadow.

ZD 20181 Fixed problem with RunwayFX effect sometimes getting rendered completely opaque on some terrains with certain view locations.

ZD 20180 Fixed issue with Phong shading where a hard edge would be visible on materials that have a low specular power when the sun is backlighting the object.

ZD 20187 Cleaned up message logs. Switched many not very helpful Info messages on both MantisClient and MantisServer to be Quiet messages rather than Info messages.

ZD 20188 Fixed a memory leak when initialising a new terrain (so either at start up or when switching terrains). An amount of memory equal to the total size of all the global textures in the MNP file was not getting freed.

Fixed problem with some MNP terrains reading large blocks of memory when using Cached File Server. Previously required the CFA block size to be increased (which causes wasted bandwidth). Now the default block size of 20KB should work in all cases.

ZD 20189 Fixed issue that would cause directional light points that point straight up or straight down to flicker greatly. This is because they are coincident with the default Up vector used for determining az and el orientation of light lobe extents. Fixed by automatically adjusting Up vector to very slightly off axis if it lies on a major axis.

ZD 20199 Fixed the following issues with fog lights:
- If non zero ramp time is specified for flashing behavior then the fog illumination fades in and out correctly but the illumination of the scene from the light would switch on and off abruptly.
- For entity fog lights as fog range is gradually decreased the illumination of the fog would abruptly turn on and remain constant with further fog range reduction. Fixed to gradually fade in.
- Limited the maximum intensity of fog illumination from a single light to 0.5.

Fixed the following issues with spot lights:
- During dusk and dawn the illumination of the fog from the spot light would abruptly switch to being very bright for a certain range of time of day.

ZD 20204 Fixed follwing issues with AdvancedWeather plug-in:
- With very wide field of views storm clouds would disappear towards the edge of the screen.
- When more than one storm cloud was enabled and the view poisition is in the 50m high band either above or below the cloud layer the cloud layer would get rendered multiple times (once for each storm cloud). This causes both a performance issue and a visual issue with the clouds appearing denser than they should.

ZD 20207 Modified algorithm used for dynamically adjusting LOD ranges in response to scene load. Previously severe rapid flickering of scene onjects could result - particularly if render time is varying rapidly.

ZD 20208: Fixed following issues on Linux:
- Crash when switching to a different .mpf file
- Fixed several Motif warnings regarding invalid scroll bar values.

ZD20210 Fixed issue with the 2.0, 3.1 or 3.2 stats not displaying when frame control master is checked but no CIGI host is active.
Also fixed them not displaying ever when domeprojection.com distortion correction is enabled.

ZD 20172 Made several changes to improve the rate at which texture and vertex data can be uploaded to the GPU.

ZD 20214 Fixed problem with the CIGI Short Component Control that enables and selects the Stats display (Component Class: System, Component ID: 6) would not select stats levels 3.1 or 3.2.

ZD 20218 Fixed problem with CustomSymbology not working on a channel if another channels name is a sub-string of the channels name. In particular this caused channels to not work if they are not the first channel on a PC and the first channel uses the default port of 15000. In this case the first channel name is a substring of all other channels names on that PC.

ZD 20219 Fixed issue that occurs when using a .cch file for the terrain and using GlobalAirport plug-in. Occasionally terrain geometry would get corrupt resulting in large bad polygons being rendered. Alternatively a MantisServer crash may occur.

ZD 20221 Fixed issue when using GlobalAirport plug-in with cracks appearing in terrains that do not have lowest two levels of detail of terrain being non-morphing

ZD 20222 Fixed following issues with AutonomousTraffic plug-in:
- Some roads ending up with speed limit of 0 so cars remain stationary on them
- Number of lanes tag for two way roads being interpreted incorrectly. This resulted in two many lanes of traffic being generated on two way roads.
- Fixed mis-allignment of vehicles on one way roads.

ZD 20224 Made q3dTexturesThatIdentifyNodesThatClampingShouldIgnore.txt, TexturesToIgnoreForNearVerticalMF.txt, TexturesToIgnoreForAllMF.txt and TexturesForTextureArrays.txt files work for .wwd terrains. The files will be loaded from each component .mnp folder.
Made Terrain Color Correction not get applied to nodes flagged in TexturesToIgnoreForNearVerticalMF.txt or by Celerity with the NodeDontClamp flag. This allows better winter snow scenes to be generated by not having snow on vertical surfaces.

ZD 20228 Fixed issue if screen blanking is enabled in .mpf or before hitting start then it was not enabled once Mantis is running.

ZD 20130 Fixed wirestrike detection to work with any powerline geometry type. Previously would only work with + cross section with a particular polygon ordering.
Also improved performance of wirestrike collision testing.
Additionally now the 5.0 stats will render the powerline segments instead of the normal geometry.

ZD 20235 Fixed conflict in the Component ID of the CIGI packests for the autonomous traffic plugin. It was conflicting with an existing packet that sets the min light point size

and light map intensity. All AutonomousTraffic CIGI packets now changed to use component ID 40 (was 35).

ZD 20243 Improvements to AdvOcean plug-in:
- Improved the way the wave blur feature works. Now reduces aliasing without making whitecaps get blurred.
- Environment map reflection was too bright on ocean and too dim on inland water. Adjusted settings to even these out.

ZD 20244 Reduced aliasing issues on RunwayFX plugin when using patchy water or obscurant (e.g. snow) and viewing runway at oblique angles.
Made polygons that use RunwayFX not get affected by Terrain Color Correction when satuartion is below 0.2.
Added new vt_no_snow OpenFlight comment to allow specific geometry to be flagged to not have Terrain Color Correction when satuartion is below 0.2.

ZD 20245 Fixed problem with Rotorwash if you jump to a new location or move fast towards it. The Rotorwash would conform to the low LOD terrain skin present when it first got there. Fixed to now keep re-scanning the terrain for LOD changes.

ZD 20246 Fixed issue with ocean clamping entites having a non level orientation when entity is first created.

ZD 20247 Fixed issue in OpenFlight2VTree. In creator time of day settings for a switch are enabled for any combination of day, dusk or night. In Mantis control of dusk and dawn is seperate. Previously dawn was set to whatever day was set to, with this change dawn is now set to whatever dusk is set to, which is a more appropriate match.

ZD 20249 Fixed problem with Cloud City Glow not working on AdvWeather plug-in if Weather Texture is set to -1

ZD 20250 Fixed problem with Rortorwash (and other effects) not appearing when inside volumetric cloud layer and the parent entity of the effect is not on screen.

ZD 20254 Fixed integer divide by zero crash if OSM data designates the number of lanes for a road as 0.

ZD 20258 Fixed issue when vt_lightelevation is set negative to flag that light should not be raised by it's radius, and it has a light group ID that can be obscured by the RunwayFX snow, then the light will never be rendered.

ZD 20259 Fixed RTFolliage plug-in to allow trees to have terrain morphing. Previously only Culture Morphing was supported.

ZD 20263 Fixed occasional "igReliableUdpComChannel::ResendPacket: Failed to retrieve packet from buffer" error message. This message turned out to be benign and caused by a CFS resend packet request being erroneously broadcast to all channels rather than just a single channel.

ZD 20264 GlobalAirport plug-in now uses CachedFileServer if enabled for loading apt.dat file.

ZD 20265 Fixed issues with frame overruns ocurring the first time Mantis is run after booting up PC, or after new NVIDIA GLCache is copied in.

RN 160831-000000 Made cloud transition band fogging roll in over first 75% of transition range, then in final 25% of transition band the cloud texture fades out. This fixes issues with the clouds becoming transparent as you approach them then switching back opaque when you get into the cloud layer.
Also removed Variation Magnitude parameter from MantisClient GUI as this has value has not actually been used since 2003.

ZD 20271 Fixed issue where visibility would have sudden slight changes as you fly through an Advanced Weather plug-in rain squall effect.
ZD 20275: Fixed occasional incorrect mapping of the channel order. This would cause some channel specific commands to get routed to the wrong channel. This could cause isectors to fail, Client VSync detection to fail, etc.
This issue would most often occur on first launch after bootup.
ZD 20276: Global Airport Fixes:
- Fixed issue with airport getting distorted in some scenes.
- Added support for LIGHT_NAMED keyword in .obj files
- Fixed issue with lines in .obj files that start with white space not getting recognized.

ZD 20277 Fixed issue with AdvWeather lightning strike CIGI responses. Multiple responses were being returned for each lightning strike - one for each channel in the system. Fixed to only return a single response.

ZD 20279 Fixed issue in GlobalAirport plug-in with runway lights having the wrong light group ID's

ZD 20282 Added new 'Timeout' setting to CachedFileServer tab. The timeout was reduced from 30 seconds to 10 seconds several years ago, but this was proving too short for systems with many channels under rapid paging. On such systems the timeout can now be increased.

3.3.1 BID 10D7 Notes

Updates/Additions

1. Added new Autonomous Traffic plug-in.
2. RN 160812-000001 - Made Terrain Color Correction also apply to Rotorwash. This makes the rotorwash go white when TCC is used to simulate snow covered ground.
3. RN 160822-000001 - Added support for two new SMC codes for Advanced Ocean inland water:
   996 - Using this code will result in the inland water being colored by the color of the terrain texture rather than the inland water color defined on the GUI. Water reflection effects will be faded out at the distance specified by the new Fade Range parameter.
   995 - Same as 996 except the water reflection is not faded in the distance.
4. RN 160901-000002 - Made auto airport lighting feature added in 3.3.0 also apply to polygonal geometry that has one of the affected light group ID's.

Added vehicle head/tail light group ID's (16055 and 16056) to the list of ID's that are controlled by the auto airport lighting.

Deficiencies Addressed

1. RN160621-000001 - Upgraded Keylok dongle driver to version 2016.1.18. This fixes issues with use on Windows 10 and Windows Server 2013.
2. RN 160621-000002 - Fixed occasional MantisServer crash at start up when using DomeProjection.com distortion correction
3. RN 160630-000000 - Adjusted the size of the glow area on light points when the intensity of the light point falls below 1.0. This increases the performance when the fog range or min pixel size is adjusted.
4. RN 160630-000001 - Remove rendering of scene if screen blanking is opaque. This gives a way via CIGI to disable a channel and blank the screen.
5. RN160816-000001 - Fixed bug where if a single HAT/HOT/LOS query took more than around 7ms to process then no HAT/HOT/LOS queries would be processed at all for the next few frames.
6. RN 160822-000000 - Fixed issue when using layered fog with the computation of foglight and spotlight illumination of the fog being incorrect. Was previously using the visibility to the top of the atmosphere as the visibility at the view location. This could lead to erroneous results if the view was in clear visibility but there was a thick fog layer above the view.
7. RN 160825-000000 - Fixed issue introduced in 2.7.0 with the inland water ripples being too severe for the selected sea state. Also made moon reflection a little brighter.
8. RN 160830-000001 - Fixed following Linux issues:
   1) Default cache folder was being set to c:/mantis/cache
   2) Occasional MantisServer deadlock at start up when using GlobalAirport plugin (and possibly some other plugins)
   3) GlobalAirport plug-in would not load custom airport scenery.
9. RN 160830-0000002 - Fixed following GlobalAirport plugin issues:
   1) If terrain mesh has relatively small polygins then precipitous cliffs could be generated at the edge of the airport flattening region. Now taper off the flattening more gently.
   2) If Inland Water or RunwayFX plugin render morphing terrain nodes then GlobalAirport plugin rendering would be messed up.
   3) If terrain culture is inside the terrain flattening region of an airport then it would be squished down to zero height. This would result in z-fighting occuring with the terrain mesh. Now don't quite flatten to zero height.
10. RN 160831-000000 - Made 2D cloud textures fade away as the view goes from 50m away from them to 0m away. This avoids the sudden popping effect when the view passes through the texture.
11. RN 160901-000001 - Fixed problem introduced when 10 bit per component frame buffer was added. If two pass alpha is disabled and dithering is enabled then only every other pixel on the screen was getting rendered. Fixed this by disabling dithering of the alpha value.

3.3.0 BID 10D6 Notes

Updates/Additions

1. RN 150901-000000 - Modified to allow eye point offsets to be used on a channel when EasyBlend distortion correction is enabled.
2. RN 150908-000001 - Improved per DiGuy character process/render time from around 0.25ms previously to around 0.1ms now. Made DiGuy LOD transition ranges respond to Scene Load->LOD scaling.
3. RN 150911-000001 - Added following new features to CustomSymbology plugin:
   - Ability for user dll to capture mouse and keyboard events
   - Ability for user dll to send data back to the Host
4. RN 150917-000001 - Added support for up to 8 per pixel local lights (spotlights and omni lights). The max number supported is set via a new drop down on the General->Graphics tab. Current limitations are:
   - Rotorwash only supports the two nearest lights to the effect.
   - AdvOCean only supports the first three lights.
   - AdvWeather only supports the first two lights
   - SpeedTree does not support any lights.
5. RN 151001-000001 - Made following improvements to light point processing:
   - Changed blend mode used when Advanced Light Point processing is enabled to make lights more visible during low visibility daylight conditions.
   - Made any light point in a light group associated with airport lighting automatically turn off during the day unless visibility is under 5 miles or cloud base is below 1500 feet (adjustable vis new parameters on General->Graphics tab). Exception is VASI/PAPI which are always on.
   - Improvements to appearance of Advanced Light Point Processing fog glow halos.
   - Made lights still use the Environment->Atmosphere->Minimum Point Size setting when Advanced Light Point Processing is disabled.
   - Fixed a problem with RunwayFX light point reflections sometimes not appearing.
   - Light points are normally rendered raised up vertically by there on screen pixel radius. This is to prevent z-fighting issues with terrain particularly when viewed from a distance. Added new capability to selectively disable this raising feature, this may be used for lights that need to align accurately with geometry such as strobe lights on wings, VASI/PAPI, etc. To enable this set the light point elevation to a negative value. Setting to -0.05 will enable the feature without enabling reflections. Setting more negative than this will also enable reflections as though the value was positive.
6. RN 151008-000004 - Improved usefulness of scene load management:
   - Added slider on MantisClient->Scene Load tab to allow the frame margin for load management to be adjusted.
   - Made AdvWeather volumetric clouds auto-adjust down the "Horiz/Vert fidelity" settings based on scene load when load management is enabled.
   - Made Cascaded Shadow map method in Shadow plugin auto adjust down the "Levels Per Frame" value based on scene load when load management is enabled.
7. RN 151019-000000 - Significant performance improvement to terrain paging

speeds when using CachedFileServer.

8. RN 151105-000001 - Added following new capabilities to DiGuy plug-in:
   - Select multiple head appearances
   - Set gaze/point/aim directions
   - Set speed of motion
   - Die/revive
   - Fire weapon, nod head, shake head. These are implemented but currently not working correctly in DiGuy 12.5.1, possibly due to DiGuy runtime bugs.
9. RN 151106-000000 - Made generic reflections on Ocean, Inland Water and RunwayFX change color correclty at sunset/sunrise. Previously they were always white.
10. RN 151210-000000 - MantisClient GUI Changes:
    - Moved FOV LOD Adjustments sub-tab from Content tab to Channels tab
    - Moved Depth Buffer Format selection from the FOV LOD Adjustments sub-tab to Channels->Params tab
11. RN 151210-000001 - Added sub-tabs to AdvWeather plugin
    Created following sub-tabs to Advanced Weather plug-in: Clouds, FogLayer, Storm. Moved parameters into these new sub-tabs. Added ability to change storm cloud parameters from the MantiClient GUI.
12. RN 061013-000003 - Added support for spotlights/omnilights to ViXsen sensor channels. Current limitations – spotlight will not appear on the following scene elements on ViXsen channels: volumetric clouds, advanced ocean, particle effects. Rotorwash.
13. RN 160113-000000 - If the host->IG CIGI packet arrives after the VSYNC has occurred MantisClient displays a warning message "CIGI: late data arrival detected...". This is printed every time the problem occurs.
    In Mantis prior to version 2.7.0 this message was only displayed if the CIGI message verbosity was set to non zero. In some older systems the host sends its data triggered by VSYNC so the message always arrives just after VSYNC. When running such hosts on new versions of Mantis we get the message being spammed to the log.
    Ideally the system should be redesigned such that the CIGI packet arrives prior to VSYNC as this will provide optimal performance.
    This fix throttles the message to only be displayed at every 5 seconds, alternatively the environment variable MantisSuppressLateDataArrivalMessage may be set to make the message only be displayed if CIGI verbosity is set to 1 (similar behavior to prior to version 2.7.0)
14. RN 160202-000001 - Added ability for Mantis to run in 'Demo' mode. This will happen if any component that is currently being used is not licensed, including if more servers than are licensed are running. When in demo mode a Quantum3D logo watermark will be displayed for 6 seconds every minute.
15. RN 160318-000001 - Integrated support for domeprojection.com distortion correction.
    As part of this also switched to using 10 bit per component framebuffer (RGB10_A2) if supported by GPU.
16. RN 160426-000000 - Added NVG Stimulation mode and associated parameters.

- Developed new Halo implementation useable without ViXsen.
- Added moon and star ambient light scalers to give added light during NVG Stimulation mode.
- ViXsen CIGI packets for halos are used for the NVG Stimulation mode (uses sensor ID = -1).
- Added new CIGI packets for NVG Stimulation mode.
- Handled spot lights for IR only or Visual only or both.
- Fixed issue with RunwayFX light point reflection being rendered during the reflection pass when scene reflections enabled. This resulted in a faint false reflection appearing above the light.
- Improved performance of light point occlusion so now all light points in scene get tested every frame rather than a restricted number.

Deficiencies Addressed

1. RN 150929-000000 - Fixed problem introduced in 3.2.3 with the MantisServer crashing if the Channels->Layout->Render check box is not checked (i.e. rendering disabled)
2. RN 150922-000000 - Fixed issue in vol-clouds if cloud city glow was non-zero and a spot light is enabled then the cloud city glow would be bright at all times of day.
3. RN 150929-000001 - Fixed problem introduced in 3.2.3 with channels that have Channels->Layout->Render check box unchecked (i.e. rendering disabled) always taking at least 16ms to render.
4. RN151001-000003 - Fixed issue with shader failing to compile when AdvOcean reflections are enabled and a shoreline is enabled and using recent NVIDIA drivers.
5. RN 151001-000004 - Fixed issue introduced in 3.2.3 with AdvWeather rain squalls flickering every 1.3 seconds under certain conditions.
6. RN151006-000000 - Fixed inability to load NTDDS textures embedded in global mnd on ViXsen sensor channels.
7. RN 151021-000000 - Fixed problem with ViXsen not recalculating atmosphere after time of day change. Also fixed problem with time of day and time of year not being associated with cached atmosphere files. This means that a cached atmosphere file for a different time of day than current may be used if all other environment conditions match.
8. RN 151105-000000 - Fixed problem in Quest2 with some residual scintillation still being present when scintillation amount is set to 0.
9. RN 151110-000000 Fixed wireframe mode not rendering anything with some scenes. Fixed wireframe mode not working at all when Quest2 is enabled.
10. RN 151118-000000 - Fixed following issues related to CIGI logs:
    - When playing back a CIGI 3.2 log, data-syncing would not occur unless Strict Data Processing was disabled. This would lead to performance issues and animations not playing.
    - When playing back a CIGI 3.2 log the Frame # on the CIGI tab would display seemingly random values
    - When recording a CIGI log the Frame # now updates on the CIGI tab

11. RN 151119-000000 - Fixed issue on Detailer Model Properties window with the Pre-Rotate pitch and roll values being swapped over.
12. RN151208-000000 - Fixed a bug introduced late in 2013 which caused culture morphing to not work correctly on databases with less than 8 terrain lod's.
13. RN 151214-000000 - Updated WibuKey driver used by JRM dongle licensing to version 6.32. The previous version of the driver was not working on Windows Server 2012.
14. RN 151214-000001 - Fixed issue with rain squalls bottom not terrain following correctly if depth sort with terrain is disabled then enabled and then the storm cloud is moved to a different location.
15. RN 141218-000000 - Fixed crash during startup in ViXsen that occrs if AdvWeather cloud shadows are enabled.
16. RN 160111-000001 - Fixed problem in AdvWeather plug-in with rain squall effect not depth sorting correctly with the terrain when the eye point is above the base of the volumetric cloud layer.
17. RN 160124-000000 - Fixed compile error in Quest2 shaders when using NVIDIA driver release 361
18. RN 160129-000001 - Fixed issue with IDATA plugin with corrupted rendering occuring when rendering two channels on a single PC
19. RN 160202-000000 - Fixed MantisClient crash when running certain CIGI logs. Problem introduced in Mantis 3.2.2.
    Playing a Cigi log in the CigiCCL tab where the Cigi log results in IG->Host packets (e.g. LOS requests) would result in and eventual crash or R6025 purecall popup.
20. RN 160413-000000 - Doubled the mapping of the terrain city glow texture as the texture was appearing too dense compared to typical ground lighting.
21. RN 160502-000001 - Fixed a memory leak in ViXsen when not using JRM. Approx 4MB of memory was leaked each time the Atmosphere is recalculated, e.g. due to time of day change.
22. RN 160503-000002 - Fixed following issues with RunwayFX light point reflections:
    1) Reflections were sometimes appearing to rise out of ground and extending up to the light point itself.
    2) On GlobalAirport plugin airports Red and green approach threshold light reflections were lower than where they should be.

3.2.3 BID 10D5 Notes

Updates/Additions

1. RN 110913-000003 - Added End User License Agreements for 3rd party components of Mantis. These are displayed during installation and may also be viewed using a shortcut from the Start menu under Mantis.
2. RN 150715-000001 - Added new Crater plugin.
3. RN 150715-000002 - viXsen: Implement new alternate NTDDS processing to

support more than 4 materials and eliminate banding artifacts when transitioning between materials that are not adjacent to eachother in the palette.
4. RN 140929-000000 - Added ability to specify a custom window to define region of screen used to generate histogram, and therefore region of screen used for AGC calculation. By default this region is the inset window, it can be overriden using the new CIGI packets.
5. RN 140930-000000 - Added separate controls for temperature and turbidity of Inland Water to Advanced Ocean plug-in.
6. RN 140117-000002 - Added support for skinned DiGuy characters to ViXsen sensor channels.
7. RN 150511-000000 - Added support for using the null modem serial cable method for synchronizing MantisClient with one of the MantisServers on the CigiCCL and CigiV2 plug-ins on Linux.
8. RN 150515-000000 - Added "Parent Velocity Scaling" parameter to particle effects. This parameter allows the size and velocity of particles to be scaled by a factor that depends upon the speed of the entity to which the effect is attached. This allows for simulation of effects such as spray and dust kicked up by vehicle wheels, so now the amount of spray and dust automatically increases as the vehicle moves faster
9. RN 150612-000001 - Added support for a vehicle track effect. This is selected from a drop down in the Detailer Trail effect tab (this tab was called MslTrail but is now renamed to reflect its other uses).
10. RN 150626-000000 - Added additional capability for processing internally generated isectors in the background mission function processing threads
11. RN 150811-000000 Made multiview plugin revert region assignments to how they are specified in the .mpf file when a Cigi reset occurs.
12. RN 150814-000000 Added features to ease copying coordinates between Mantis and Google Maps:
    - When hitting the waypoint Save button on the stealth tab the current view position is now also saved to the clip board in the format <Lat>,<Long> and can be directly pasted in Google Maps.
    - When left clicking anywhere on the render window the location of the intersection is now also displayed in geodetic coordinates (used to only display geocentric). Additionally the <Lat>,<Long> of the intersection point is copied to the clip board and can be pasted into Google Maps.
    - In either the Latitude or Longitude field of a waypoint on the stealth tab you can instead paste the latitude AND longitude separated by a comma. In Google Maps clicking anywhere brings up a dialog containing the <Lat>,<Long>. This can be now copy and pasted directly into either the waypoint lat or long field. Also, checking Auto-Apply will result in the view immediately moving to that location.

Deficiencies Addressed

1. RN 140911-000001 - Fixed following issues with MNPView:
   - Crash when viewing tiles that have external references
   - Popup render window sometimes not rendering and causing main render window to have corrupt textures

2. RN 140911-000002 - Fixed issue when updating ViXsen, e.g. due to time of day change, the update was taking a very long time to complete if a .vt terrain was being used.
3. RN 140912-000000 - Fixed a problem introduced in Mantis 3.2.0 where if the Content->Terrain->Draw During Load checkbox was checked then corrupt textures would appear on terrain temporarily after performing a hyper-jump.
4. RN 140917-000001 - Fixed problem introduced in Mantis 3.2.1 where terrains generated by Celerity using this version of the MantisSDK would cause MantisServer to crash when loading.
5. RN 140918-000000 - Fixed problem with AdvOcean, AdvWeather and precipitation not performing the correct mapping of temperature to radiance on sensor channels. This caused odd effects particularly on sensors with narrow pass bands and large temperature dynamic ranges.
6. RN 140929-000001 - Fixed following issues in Detailer on Linux:
   - Stencil buffer would not initialize correctly resulting in incorrect sorting of wake and bowspary effects with the model.
   - If a model in the .scd file does not have matching case with the file on disk, and the model search path needs to be used to locate the file, then the model would not be found.
7. RN 140930-000001 - On Linux systems the NIC adapter order seems to change randomly on each reboot. This meant that the -nic N command line option to MantisServer to select the Nth interface would often select a different adapter after a reboot. This is now fixed by sorting the IP addresses numerically. So N now selects the Nth IP address of the system when placed in numerical order. Also, selecting a value higher than the number of IP addresses available will cause a list of index to IP addresses to be generated in the message log. This can be used during system configuration to determine the appropriate indexes to use.
8. RN 131202-000007 - Fixed issue on sensor channels with sparkling pixels appearing on distant terrain - particularly mountain ridges, and on the advanced ocean at the horizon.
9. RN 141017-000000 - Fixed a problem when using ViXsen and Quest2 regarding erroneous error messages. If a channel has a Quest2 sensor ID that does not have a corresponding ViXsen sensor ID, then ViXsen would generate an error message every time the host sends either a AGC Enable packet or a Background Manual Gain and Level packet targeted at the Quest2 sensor ID.
10. RN 141028-000001 - Fixed problem with halos on NVG sensor channels sometimes flashing on and off for no apparent reason.
11. RN 140314-000000 - Made some changes to eliminate frame overruns when certain environment state changes.
12. RN 141029-000000 - Improved the appearance of halos in NVG mode. Previously halos would suddenly switch on and off as light points pass behind other objects in the scene. This has been improved to now include a calculation of the proportion of the light point that is visible such that halos fade out and in asit move behind objects. This greatly reduces halo flashing in the scene.
13. RN 141118-000001 - Fixed following issues with Advanced Weather plug-in:
    - Lightning bolts were not visible in a storm when the rain squall effect is enabled

for the storm.
- When depth sort with terrain is enabled and a rain squall effect is inside the field of view and the viewpoint is above the cloud layer, then the cloud layer would not depth sort with the terrain correctly.
- Lightning was not appearing correctly in reflections such as ocean, inland water, and runway reflections.

14. Fixed problem where a shader parameter may not get updated if it's previous value was a NAN. This problem only occurs on 64 bit Mantis. This resulted in the ocean being rendered peak white on ViXsen sensor channels when using certain sensor settings.
15. RN 140725-000000 - Fixed problem with SpaceController 3D mouse not working with 64 bit MantisClient.
16. RN 141121-000000 - Fixed the following issues with the AdvOcean plug-in on ViXsen sensor channels:
    - The shoreline breaking wave effect was too bright. Fixed to use the same intensity controls as the whitecap foam.
    - The shoreline beach region was very dark on NVG channels.
    - Bowspray and wake was very dark in NVG
17. RN 141121-000001 - Fixed DiGuy characters not appearing inside AdvWeather volumetric cloud layer. This may be required for example if using the cloud layer to simulate volumetric patchy fog.
18. RN 141125-000000 - Fixed problem with effects not being rendered on some channels under certain conditions.
    Also fixed incorrect initialization of Missile Trail effects which causes a crash if train duration is set very large.
    Also fixed crash that can occur if Fast Particle Effects is enabled and 32 Bit Float depth buffering is not also enabled.
19. RN 141210-000001 - Updated Rotorwash plug-in to use GlSL shaders (was using shader assembly) and made the following fixes:
    - Fixed to work correctly on ViXsen sensor channels. Previously rotorwash just appeared black on sensor.
    - Fixed elongated particles to rotate with view roll. Previously they always maintained the same orientation on screen.
    - Fixed to accept longer sensor material system names. Previously names longer than 32 characters would not work.
20. RN 141215-000000 - Made the following fixes to the exception handling that occurs when MantisClient or MantisServer crashes:
    - Registers are now displayed in 64 bit mode (previously only worked in 32 bit mode)
    - Call stack is now displayed in 64 bit mode (previously only worked in 32 bit mode)
    - Symbols are displayed in callstack
    - File & Line numbers are displayed in call stack if .pdb file is available
    - The callstack is now correctly written to MantisServer.txt and MantisClient.txt files.
21. RN 141210-000002 - Fixed problem on 64 bit Mantis with precipitation effects

such as rain and snow that are enabled in the .mpf configuration disappearing shortly after start up.

22. RN 150119-000000 - cgInstall does not allow a NIC card that has had it's MAC address manually overridden to be used for Mantis licensing. A problem with the detection of overridden MAC addresses has been found with some NIC drivers in that cgInstall was still detecting the MAC as being overridden if the override was first enabled and then disabled. This problem is now fixed.
23. RN 150128-000000 - Fixed intermittent MantisServer crash issue when performing Background MFP intersections on 2D cloud layers while the cloud layer geometry is being updated, e.g. by changing far clip plane.
24. RN 140430-000000 - Fixed issue introduced in Mantis 3.2.0 where a small window displaying textures as they are paged in would appear on Sensor channels that have Quest2 enabled and have rain enabled using the particle method.
25. RN 150206-000000 - Fixed problem on ViXsen NVG channels on moonless nights whereby the terrain and moving models would go black for a few seconds each time the materials were updated. This occurs periodically due to time of day changes, and also whenever certain environment parameters such as visibility are changed.
26. RN 150217-000000 - Fixed problem with adding Quest2 plugin on Linux systems. When first selecting channels on the Quest2 plugin a popup window would appear indicating that sensor ID may not be 0. This pop-up could not be dismissed with the mouse (though pressing enter would work), additionally the rest of the Linux desktop would be unresponsive until the window was dismissed.
27. RN 141223-000000 - Fixed issue on Linux in that an external reference from an mnp file would not load if the case of the filename did not match the case of the reference.
28. RN 150223-000000 - Fixed problem on Linux where by case insensitive matching of folders was not working. This meant that sensor databases that where the "Sensor" terrain sub-folder did not have this exact case would not be detected and the OTW terrain would be loaded instead. This issue most likely also affected other areas of Mantis where folder case mis-match may occur.
29. RN 150318-000000 - Fixed problem with MantisServer sometimes crashing when many models are loaded and using ViXsen in 64 bit Mantis. This is a problem in the JRM SigSim library.
30. RN 150326-000000 – Fixed issue with MantisServer failing to create on OpenGL render context on some systems.
31. RN 150403-000000 - Fixed performance issue when host sends multiple Quest2 related CIGI packets per frame. Each packet was causing the Cigi tab to be refreshed. If too many packets were received this would delay when MantisClient could pass on all the data to MantisServes and would result in DataSync spikes. This fix turns off updating the MantisClient Quest2 tab in response to CIGI commands. As a result what is displayed will be the value from the .mpf fileor the last value set manually on the tab, it will no longer display the last value received via cigi.
32. RN 150520-000000 - Made the following improvements to Missile Trail effect:
    - Fixed bug where texture on trail would start moving along trail once trail has

reached full length.
- Modified default values when adding effect Detailer to give a better starting effect.
- Fixed issue with the supplied trail textures TrSmoke<N>.rgba in that they had the RGB pre-multiplied by alpha which gave a dark halo effect to the trail.
- Fixed issue with last node of trail disappearing before it is fully faded.
- Added option to set expand time to 0.0 will now cause trail to start out with width rather than starting at a point.

33. RN 150612-000000 - Fixed problem introduced in Mantis 3.2.1 which would cause the Advanced Ocean to render in all MultiView channels using the view position and orientation of the first channel.
34. RN 150612-000002 - Improved rendering performance of wakes. Also modified such that the speed scale factor works better. Previously the entire wake would change width as the ship changed speed, now the speed of the ship affects only those segments emitted when the ship was traveling at that speed.
35. RN 140206-000001 Fixed problem with CIGI packets being missed when playing back a log in fast forward.
36. RN 150812-000000 Fixed issue with collision segments and collision volumes not rendering in Detailer unless the entities picakble check box was checked.
37. RN 150819-000001 Fixed problem with effects that are attached to entities that are not set to be depth sorted in the .scd file not sorting against the cloud and vol clouds correctly. This problem was introduced in Mantis 3.0.5.
38. RN 150819-000000 Fixed issue when using ViXsen without Quest2 and in NVG mode. Under these conditions the red and blue channels of the frame buffer were not getting cleared each frame.

3.2.2 BID 10D3 Notes

Updates/Additions

1. RN 140709-000000 - Upgraded CigiCCL plug-in to use latest CigiCCL library and added support for Cigi 3.3. Main difference when using 3.3 is that time of day is interpreted as UTC rather than local time.
2. RN 140718-000000 - Added General->Graphics2->Anisotropic Filtering drop down. This allows application control of the default level of anisotropic filtering to use. Previously default level was always 1, which meant to get better filtering required overriding from the NVIDIA control panel. But overriding would override all anisotropic filtering. Some features such as Global Airport plugin try to improve appearance by using a high filtering level - which would be defeated by the override. Adding the control to the client GUI allows default filtering level to be set without defeating such features.
3. RN 140725-000000 - Added support for Space Controller and 3DConnexion USB 3D Mouse controllers. These can be used as an alternative to a joystick when in Stealth mode in Mantis.
4. RN 140804-000001 - Added Cigi controls for Quest2 AGC Threshold and Target parameters for both inset and background windows.

Deficiencies Addressed

1. RN 080328-000004 - Fixed crash and responsiveness issues in MnpView
2. RN 140416-000003 - Fixed problem introduced in Mantis 3.2.0 with RTFoliage plugin not working when a .tbd file is used to define the trees. Fixed problem with RTFoliage plugin on Linux with .spt files not loading if the filename has any upper case letters.
3. RN 140703-000003 - Fixed problem with the Quest2 Output Mode set to No Output not working. This problem was introduced in Mantis 3.1.6.
4. RN 140707-000000 - Fixed some formatting issues in CigiTestGUI_v20 and CigiTestGUI_v30. Send and Exit buttons were appearing over other parts of the GUI. Adding tabs would get truncated on the right side.
5. RN 140721-000001 - Fixed problem with terrains referenced in World Wide Database .wwd files not working when Windows style path is used on Linux and vice-versa.
6. RN 140723-000000 - Fixed problem with case insensitive filename matching on Linux only being performed with Windows style file names. This was causing some files that had incorrect case from loading when the path specified to the file was Linux style.
7. RN 140724-000000 - Fixed an intermittent timing related crash issue when paging terrains. Issue has always existed but may be more evident in 3.2.0/1 due to improvements in paging speed.

3.2.1 BID 10D2 Notes

Updates/Additions

Deficiencies Addressed

1. RN 140617-000001 - Fixed lighting that affected Mantis utilities, such as SpliceTree and Audition, introduced in Mantis 3.2.1.

3.2.1 BID 10D0 Notes

Updates/Additions

1. RN 140429-000003 - Added new GlobalAirport plug-in to provide implementation of most of worlds runways.
2. RN 140530-000001 - AdvWeather plug-in fixed following issues introduced in Mantis 3.2.0:
    - Sun backlighting on close up clouds was too bright on lower surface of cloud layer
    - City glow was not appearing on close up clouds.
    - Fixed following issue that has always been there:
        - The weather texture had a slight offset from its correct location at start up. This would fix itself whenever certain cloud parameters

were changed for the first time.

3. RN 140610-000000 - Added following features to Quest2 plug-in:
    - Non-Uniform Calibration (NUC)
    - Non-Linear Gain
    - IG->Host Cigi packet with AGC gain/level
4. RN 140617-000000 - Added "Join QuadroSync Swap Group" check box to Channels->Params tab to provide an alternative cleaner method to the VTREE_ENABLE_GSYNC environment variable method for enabling QuadroSync frame swap synchronization on select channels. Removed the following deprecated controls from the Channels->Params tab: High Availability; Video Reset; Fog Density, Color, Start, End and Quality; Linear option from Fog Type drop down.
5. RN 140617-000001 - Previously the sun and moon light intensity was not affected by the visibility settings. This made the scene appear too bright with low visibility. In particular, light points could barely be seen during low visibility daytime conditions as they did not have much contrast against the terrain. Modified the code such that diffuse and specular light intensity of the sun and moon is automatically attenuated from1.0 to 0.0 as the horizontal visibility at the view altitude drops from 3000m to 1000m. The ambient light intensity of the sun and moon is unaffected.
6. RN 140624-000000 - Improved texture paging performance. Increased the chunk size used when incrementally downloading textures. This reduces overhead of using large per frame texture downloads. Increased the default Content->Pacing->Texture->Max Bytes Per frame to 1MB. This is also now the recommended value to edit exiting .mpf files to use.

Deficiencies Addressed

1. RN 140211-000001 - Fix for problem that may cause crash in ViewportEffect plugin when the cigi stream contains a Q3d Extension Packet.

2. RN 140310-000000 - Fixed problem with light point turn on/off times being at fixed time of day. This meant that light points would turn on too late in winter and too early in summer. Also, when crossing a time zone boundary the lights could turn on or off. Fixed this by making turn on/off times be determined by the sun elevation. If enabled for dawn, dusk and night then light points will now turn on when sun is below 3 degrees above horizon. If enabled for night only then light points will now turn on when sun is below 6 degrees below horizon (end of civil twilight).
3. RN 140317-000000 - Improved appearance of CityLights texture used for AdvancedWeather plug-in Terrain City Glow feature.
4. RN 140408-000000] Fixed bug introduced in 3.2.0 that would cause DiGuy to crash on certain scenes.
5. RN 140416-000002 - Fixed problem with RTFoliage trees and grass not working. Problem introduced in 3.2.0
6. RN 140422-000000 Fixed problem introduced in 3.2.0 which would cause some objects to be badly lit if the General->Graphics2->Use Diffuse for Ambient check

box is not checked.
7. RN 140429-000000 - Modified the Cigi plugins to smooth out the interval between when SOF messages are sent to the host. Previously these messages were subject to any jitter in when the GPU driver returned from performing a swap buffers.
8. RN 140507-000000 - Fixed issues with incorrect LOS/HAT/HOT results when shadows or scene reflection enabled and background mission functions enabled.
9. RN 140507-000001] - Fixed shader compile error for Inland Water shader when using cascaded shadow maps and AdvOcean with ocean shadow receiver enabled with some GPU driver versions.
10. RN 140508-000001 - Fixed following issues with SpliceTree:
    - Sub-windows to view branch or previous branch were not rendering correctly.
    - Axis was not rendered on main window when enabled.
    - Added option to also save out all textures in the model when not embedding textures.

3.2.0 BID 10C2 Notes

Updates/Additions

None

Deficiencies Addressed
1. RN 120419-000002 – Fixed 64-bit start menu shortcut icons
2. RN 131119-000003 - Fixed crash that occurs when closing some popup dialogs on Linux
3. RN 131121-000000 - Fixed long pause on some Quest2 channels at startup
4. RN 131210-000002 - Fixed problem with materials displaying incorrectly on ViXsen channels with Linux build when JRM not licensed.
5. RN 140303-000001 - Fixed problem with lightning rendering incorrectly and causing clouds to render incorrectly.
6. RN 140303-000002 - Fixed shader compile errors that occur on some GPU driver versions.

3.2.0 BID 10C1 Notes

Updates/Additions
1. RN 131119-000001 - Switched default shade mode for entities to Phong shading. Terrain still uses Gourraud shading. Environment variable MANTIS_NO_PHONG can be set on Client to revert default shade mode for entities back to Gourraud shading.
2. RN 131209-000004 - Performance improvements. Note that these improvements now require the GPU driver to support OpenGL 3.3 or later:
   Removed support for fixed function OpenGL rendering pipeline from the core of VTree - this was requiring a large number of OpenGL calls and CPU overhead to

keep the fixed function pipeline in sync with the shader pipeline. All rendering is now performed using shaders.
Switched all shaders to use GlSL instead of Cg.
Switched to using hardware clip planes when rendering the high LOD clouds.

3. RN 140102-000001- Improved handling of spotlights:
    - Custom spotlights can now just use a regular 2D texture rather than having to create a 3D texture offline.
    - Support for multi-colored custom spotlights defined by rgb texture
    - Eliminated need to internally create multiple textures at different intensities which now reduces spotlight texture memory usage
    - Slight CPU overhead reduction
4. RN 140130-000003 - Updated most Mantis related applications icons to use new design 24 bit color + 8 bit alpha 256x256 icons
5. RN 140206-00000 - Made the following improvements to Cigi log playback in CigiCCL plug-in:
    - Added slider for adjusting playback speed, supports slow motion and fast forward.
    - Fixed the time field to reflect the correct time into the log rather than the time since the play button was last hit.
    - Added display of Frame counter from IG Control packet of current frame.
    - New media buttons (also added to CigiV2 plug-in)
6. RN 140207-000000 - Added checks to verify that the display specified by the MantisServer DisplayID command line option is attached to the desktop. If it is not then information on all displays are listed to the MantisServer message log to aid in selecting the correct Display ID to use.
7. RN 140214-000001 - Added new option to CigiUtilsCCL utility to allow Cigi logs to be dumped to a csv file. This allows the log to be loaded and analyzed in a spreadsheet program such as Excel.
8. RN 140127-000002 - Upgraded Mantis to use DiGuy Version 12.5. Added support for skinned DiGuy characters (appearances beginning with sk_)and characters with bump maps and specular maps. Note that skinned characters will currently not appear correctly on ViXsen sensor channels.

    Other Improvements:
    DiGuy characters are now rendered using phong shading and now can cast shadows when using one of the shadow map methods.
    Uniform shadow map method improved by fading the shadows out in the distance instead of the previous abrupt cut off.

Deficiencies Addressed

1. RN 080328-000004 - Fixed problem with MnpView utility becoming unresponsive on some systems. Also fixed all toolbar images to the right of Wireframe button to match the function performed.
2. RN 080616-000004 - Removed MantisServer licensing warning messages since we now always use client side licensing. The MantisServer About window will now

just say that 'Client side licensing is enabled' rather than indicating the state of the MantisServer license.
3. RN 091203-000001 - Removed deprecated Model and Texture path buttons from MantiClient->Content->Models tab. Updated user manual to remove these buttons.
4. RN 120518-000000 - Fixed MantisClient crash that sometimes occurred when loading a new .mpf file if the currently loaded configuration has any 2D cloud layers defined.
5. RN 131120-000003 -Fixed crash when exiting Detailer. Problem introduced in version 3.1.6.
6. RN 131209-000007 - Fixed problem in Detailer if loading a scd file that references a model that could not be found in the model path and collision segments are defined for the model in the scd file. Detailer would erroneously detect a mismatch between model and scd file segments and ask if the model should be updated. If Yes was selected then a crash would occur.
7. RN 130724-000003 - Fixed MantisServer crash when AdvWeather plugin scatter intensity is set above zero and scatter angle is set very small or zero,
8. RN 140107-000000 - Fixed problem with ground clamped models sometimes not appearing for up to 1 second after they first should come in to view. If shadows are enabled under certain conditions the model may never appear.
9. RN 140114-000003 - Fixed performance problems when adding and removing lots of entities at the same time.
10. RN 140114-000004 - Fixed problem which would prevent any further Python Scripts from loading if an error was found in any script. Also now prints out some Python errors that were previously quietly ignored.
11. RN 140124-000001 - Fixed problem with MantisServer crashing when switching terrains if the Advanced Ocean plugin is loaded.
12. RN 140228-000003 - Fixed potential issue when host updates time when vlos is close to time zone boundary

Linux Specific Mantis Bug Fixes:

1. RN 131209-000006 - Fixed problem with texture/model path ';' separator not being recognized when running on Linux.

2. RN 131211-000000 -Fixed following filename issues on Linux.
    1) if the sensor mnp database was not in the sub-folder Sensor with an exact case match for Sensor then the OTW terrain would be loaded instead. If using CFS this would also sometimes cause the terrain not to load at all.
    2) If a special effect does not specify a texture then a warning message would be displayed regarding not being able to load a texture.
    3) skymodel.dat files would not be loaded if the file name was not all lower case.

3. RN 131120-000001 -Fixed problem with drop down menus on Linux sometimes causing issues. e.g. Each time a flame effect is added in detailer the number of

images would increase by 32 resulting in bad images in the animation.

4. RN 131119-000004 -Due to an incompatibility between tooltips and OpenGL rendering when running on Linux, the tooltips in Detailer are now disabled whenever the rendering window is open on Linux.

3.1.6 BID 10BC Notes

Updates/Additions

1. RN 131009-000003 - Created new MultiView plug-in to allow multiple view windows to be displayed on a channel, e.g. for rear view mirrors or PIP inset windows.
2. RN 131107-000002 - Effects fixes and new features, and Detailer fixes and new features:

Detailer New Features:
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a. Added tooltips to Detailer (Enabled from the Help menu item).
b. Added Accumulate and Distort blend modes for particle and spark effects,
c. Added support for rendering particles using volumetric shader to eliminate hard edges where particles intersect other geometry.
d. Particles can now inherit parent velocity using the new Parent Velocity Decay parameter.
e. Particle and Spark effects Twist Rate parameter now defines a maximum twist rate. Particles will be assigned random twist rates between -TwistRate and +TwistRate.

Detailer bug fixes:
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a. Fixed Detailer ground plane grid to not disappear if the model moves too far
b. Fixed Detailer to to also use the path set from the options menu to locate models.
c. Particle and Spark effects Src Radius parameter now works for Stream effects, previously only worked for Burst effects.
d. Particle render order fixed to eliminate cyclic effects. Particles are now always rendered in the order in which they were generated,

Mantis New Features:
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a. Support for all above changes in effects produced in Detailer,
b. Added option for rendering particles to half size offscreen buffer to improve fill performance of particle effects.
c. When a particle effect is stopped via CIGI, it will now simply stop generating new particles, existing particles will continue for the life of the particle.

Deficiencies Addressed

1. RN 130917-000001 Fixed problem with AdvWeather plug-in fog layer generating incorrect fogging for polygons which have vertices behind the view point.
2. RN 131015-000000 Fixed problem with high dynamic range sun effects not working on Quest2 since Mantis 2.8.1. This is the effect where if the sun comes in to view on OTW channel with Quest2 the scene AGC should clamp down significantly but the sun should remain bright.

3. RN 131106-000000 Fixed problem with TestPattern plug-in texture map file open dialog only working correctly the first time it is used.

3.1.5 BID 10B8 Notes

Updates/Additions

1. RN 130619-000006 Added Mercury, Jupiter and Saturn to ephemeris model. Previously of the planets only Venus and Mars were rendered.
2. RN 130805-000000 Created new LaserDesignator plugin to simulate the beam of a laser designator on sensor channels.
3. RN 130809-000003 Added support for synchronizing multiple IG's. This is achieved by: 1) adding a CIGI short component control to allow the host to set the animation clock, 2) Adding a deterministic option to locating 2D cloud layers, and 3) modifying the old method of IG synchronization on the advanced ocean to instead use the new synchronized animation clock method.

4. RN 130905-000004 Added partial support for CIGI Sensor Control and Sensor Response packets.
5. RN 130910-000002 Added ability to read and display dongle license info from cgInstall
6. RN 130909-000001 Added ability to set expiration date on Mantis Dongle.

Deficiencies Addressed

1. RN 130606-000004 Removed warning message when loading TestPattern plug-in if no texture map for the texture map pattern is defined.
2. RN 130613-000001 Fixed problem that occurs if all the subface z-offsets in the visible scene are all the same then adjusting the General->Graphics2->Subface Offset Scale slider has no effect while Mantis is running. The initial value of the slider when starting Mantis would be used but subsequent changing of the value would have no effect.
3. RN 130617-000002 Fixed warning message during start up regarding client/server message being too large to send reliably. This was actually caused by the message to initialize the skymodel so some parts of the sky model may not have been initializing correctly.
4. RN 130619-000001 Fixed problem with Advanced Ocean plug-in Environment Map drop down getting double entries if the page is modified but not applied, then clicking to another tab and then back to the Advanced Ocean tab.
5. RN 130620-000016 Fixed slight error (less than 1 degree) in position of sun and planets in the ephemeris model.
6. RN 130625-000001 Fixed problem in AdvancedWeather plug-in with the depth sort with terrain option not working on NVIDIA driver version 310 or later.
7. RN 130716-000001 Stars through NVG sensors look larger than OTW. To simulate this modified Mantis to render the stars larger on NVG channels. The default scale factor is 4.0, but this can be modified using MANTIS_NVG_STAR_SCALE environment variable.
8. RN 130816-000001 Fixed crash in MnpView when loading a terrain. Problem introduced in Mantis 3.1.3
9. RN 130820-000003 Fixed a possible issue that may cause paging center offset to stop working under certain conditions.
10. RN 130820-000007 Fixed a problem where if the HAT/HOT or LOS limit was set high on the Channels->Layout tab (e.g. > 200) then you would start to see periodic DataSync glitches which get exponentially larger. The larger values are used.
11. RN 130903-000000 Some older MNP terrains contain indices to materials that fall outside the range of materials defined in the database. When this occurred the geometry would end up using a random material. This would result in the geometry appearing different colors each time Mantis is run up or on different channels. As a workaround such out of range material indices are now clamped to be within range. This will at least give consistent results each time the terrain is loaded.

3.1.4 BID 10AC Notes

Updates/Additions

None

Deficiencies Addressed

1. RN 130201-000002 – Re-implemented datasync changes. Added back the changes to datasync made in Mantis 3.1.2 patch 5. These were backed out in Mantis 3.1.3 patch 3 due to intermittent lockup issues that were occurring as a result of the change. This new code fixes those lockup issues.
2. RN 130315-000003 – Fixed TestPattern plug-in to work correctly with EasyBlend distortion correction. Fixed test pattern plug-in so that the spherically mapped patterns use the correct view parameters when EasyBlend distortion correction is used.
3. RN 130315-000006 – Fixed problem introduced in 3.1.3 with Mantis sometimes not initializing correctly. Fixed problem introduced in 3.1.3 with Mantis sometimes not initializing correctly.
4. RN 130322-000006 – Fixed problem with render order of light points and RunwayFX. Increased the size of the light point vertex buffers. This is to fix a problem with the lights not being rendered in the correct order wrt the RunwayFX if there are too many light points in the scene.
5. RN 130325-000005 – Launching the Muts produces the following error: UnitTestDriverCCL.exe has stopped working. Fixed problem introduced in 3.1.3 with MUTs crashing at start up if not running from the folder specified by the MantisInstallDir environment variable.
6. RN 130426-000001 – Fixed MantisServer discovery to use selected IP interface:
    - The server discovery was always being performed on the first network interface found on the client PC. When UDP mode was selected the subsequent Client/Server communication would be done on the selected session IP interface.
    - This could lead to problems. e.g. If the servers are on the first network but not on the selected session interface then they would be listed by the discovery but would not run because later Client/Server communication would fail. Also, if the servers were not accessible on the first network then they could never be discovered even if they are accessible on the session IP interface.
    - Fixed this problem as follows - removed option to use TCP for the Client/Server communication, UDP is always used now. Fixed the discovery process to use UDP multicast rather than UDP broadcast. This enables discovery to be performed on the selected session IP interface.

    - Added MANTIS_MULTICAST_ADDRESS environment variable to control whether Mantis uses Multicast or Broadcast UDP packets. If not set then the default UDP multicast addresses are used

(239.255.183.202-206). If set then the 4 addresses starting with the specified address are used. If set to 255.255.255.255 then UDP broadcast is used rather than Mutlicast.

7. RN 130513-000002 – Fixed intermittent problem with GDC. Fixed problem with Boeing GDC sometimes not getting enabled on a channel.

3.1.3 BID 10A4 Notes

Updates/Additions

1. RN 121008-000009 – Added new Host-side mission function API

Deficiencies Addressed

1. RN 130102-000002 – Fixed an issue introduced in version 2.9.0 which caused near vertical LOS intersections with the advanced ocean to fail.
2. RN 130108-000007 – Fixed issue where if ocean clamping is enabled with the mass, length or width of the vessel set to zero then ocean clamping for that entity will permanently not work and the entity may disappear.
3. RN 130108-000008 – In older detailer versions, all settings (model parameters and CIGI ID's) from an existing model could be copied as a starting point even when loading a new VT with a different name. Most of this functionality was moved into the duplicate button, but it did not completely retain all possible settings, The ability to choose a different VT model path was also not correctly working. These options were added along with numerous related bug fixes:
    a. CIGI ID's are now reset when adding models or changing selection.
    b. Fixed ability to merge scd settings when choosing a different model in the path tab.
    c. Collision segment changes between model and scd are now correctly detected and applied to model only with permission.
    d. Duplicate Model now clones CIGI type assignments.
    e. Collision segment comparison works now using vtAlmostEqual
    f. Delete Model was leaving a dangling model pointer in the render window.
    g. Avoid deletion of CIGI assignments when a unique ID cannot be generated
    h. Use temp dir for animation script editing
    i. Light intensities from the .scd file are reflected in the render window when selecting a new model.
    j. Minor UI update issue with Animations tab
4. RN 130108-000009 – Fixed following problems with Advanced Light Points:
    a. In very dark scenes with heavy fog the light point glow would appear square at certain ranges.
    b. Light point glow for runway light point reflections was not being modulated by the reflection intensity
    c. When runway light point reflections and glow were displayed the reflection would smear downwards to the edge of the glow
    d. Runway light point reflections were not being fogged out correctly

5. RN 130114-000002 – Fixed filename of MantisServer message log to include {XX} identifier to distinguish between multiple channels running on the same PC
6. RN 130201-000002 – On some configurations (e.g. running Mantis on GeForce) there is an intermittent problem with the DataSync when the SOF time is large (e.g. 8ms). The DataSync for the next frame gets interpreted as the DataSync for the current frame. This leads to the DataSync time on the 8.1 stats appearing a little after when SOF was issued (i.e. 16.666ms minus SOF lead time). This considerably reduces time available for rendering. To fix this added a timeout for waiting on DataSync of 3ms past the VSync. For complex reasons this timemout is disabled the first time DataSync gets enabled. This modifies the previous behavior as follows. If DatSync and Frame Control Master are both enabled at start up and the host is not yet sending igControl packets then rendering will stall until the first igControl packet is sent. If the host then stops
sending igControl packets - previously rendering would stall, but now rendering continues but the DataSync will show a time of around 3ms leaving less time in the frame to render.
7. RN 121203-000002 – Fixed problem when switching an entity from no-clamping to Ocean Clamping with the clamping not getting enabled correctly. Fixed problem with conformal clamping over ocean in geocentric mode - the vessel would be oriented at a strange angle. This fix will also fixes the normal returned by LOS queries that hit the ocean - these will now return the correct surface normal.
8. RN 130204-000003 – When unlocking to registry cgInstall would display the maximum version licensed in the summary dialog. This was not being displayed if unlocking to a Dongle. Fixed to now display version.
9. RN 130204-000004 – Some databases contain invalid bounding boxes and cull spheres caused due to some vertices having NAN values. 32 bit Mantis would display these OK but they would not appear on 64 bit Mantis. Math operations on NANs is undefined which would account for the different functionality. Fixed the problem by adding code to validate and fix cull spheres and bounding boxes as they are read in.
10. RN 121206-000005 – Fixed problem where Detailer will stop responding when opening a SCD file by program association in Win7
11. RN 130220-000008 – Fixed a problem with LOS queries. If the host performs a series of LOS queries on consecutive frames where the start location of the LOS does not change but the end location does change, then sometimes the end location change would not be registered before performing the query.
12. RN 130308-000004 – Fixed issue introduced in Mantis 3.0.2. If the view is attached to an entity whose placement is not updated every frame then the attachment position of the view was being calculated relative to the location of the entity the previous frame. This could cause issues if the entity was moved using a rate control.
13. RN 130315-000003 – Fixed TestPattern plug-in to work correctly with EasyBlend distortion correction.
14. RN 130315-000006 – Fixed problem introduced in 3.1.3 with Mantis sometimes not initializing correctly.

3.1.2 BID 10A1 Notes

Updates/Additions

Advanced Weather Plug-in:

1. RN 120501-000006 – Fixed problem with HAT/HOT/LOS intersections with AdvOcean or AdvWeather clouds returning incorrect results under certain conditions when background mission function processing is licensed. This problem was particularly bad when shadows are enabled.
2. RN 120824-000002 – AdvancedWeather plug-in improvements: Fixed some interpolation artifacts that were sometimes visible on clouds; Improved performance when Depth Sort with Terrain is checked; Eliminated some artifacts seen when moving forward at the point where the cloud meets terrain when Depth Sort with Terrain is checked.

RunwayFX Plug-in:

1. RN 120904-000000 – Fixed bug introduced in Mantis 3.0.5 which caused any semi-transparent runway geometry (such as alpha faded runway markings) to appear on top of the RunwayFX effect.

Advanced Ocean Plug-in:

1. RN 120905-000004 – Fixed a problem with AdvOcean plug-in ocean clamping - If the clamped height of the vessel exceeded 15m above 0 altitude then the clamping would become unstable. This would occur if either the AdvOcean "Sea Level" parameter was set such that wave heights could exceed 15m above 0 altitude, or if the clamp height offset for the vessel was set such that it went above 15m.

Rotorwash Plug-in:

1. RN 120501-000006 – Fixed problem introduced in 3.1.1 patch 1 that stopped the Rotorwash effect from working.

Real Time Foliage Plug-in:

1. RN 121011-000000 – Fixed problem with RTFoliage plug-in where it would wait until the trees or grass are rendered before compiling the necessary shaders to render them. This resulted in a glitch the first time trees or grass come in to view.

Deficiencies Addressed

1. RN 120823-000002 – Fixed problem with MantisServer crashing when BoeingGDC distortion correction is enabled in 32 bit Mantis. Fixed problem with MantisServer crashing when BoeingGDC distortion correction is disabled in 64 bit Mantis. Note that disabling GDC is not really supported and image will be corrupt if disabled.
2. RN 120906-000001 – Fixed problem that occurs if there are no channels assigned

to sync group 0. When the Content->FOV LOD Adjustments tab is selected the drop down will indicate that another sync group is being edited - but changes made still get applied to the unused sync group 0.

3. RN 120918-000002 – Fixed problem on systems where GLInterceptor is installed on the Client PC where MantisClient would crash when a preview model is added. This prevented the model preview feature from being useable on IDX systems.
4. RN 120924-000007 – For very high altitude simulations a mode can be enabled which causes the sky to fade towards black above a specified elevation. However, the stars were not appearing even when the sky is completely black. Fixed to make stars appear when fade to black kicks in.
5. RN 121003-000000 – Fixed error in the interpretation of frustum values in EasyBlend mesh files, This would cause EasyBlend distortion correction to fail to match up adjacent channels correctly.
6. RN 121029-000001 – Fixed problem with using 'Paging Center Offset' feature. Previously when using this the vertex range used to morph when doing dynamic terrain LOD morphing was still being calculated as the range of the vertex from the eyepoint. This has now been changed to instead use the range of the vertex from the offset paging center. This now makes the terrain in the vicinity of the offset paging center appear at its highest LOD as would be expected.
7. RN 121031-000009 – Fixed problem with the VSync render event as enabled when client and server comm ports are both set to 8 on the CIGI->VSync tab. The sync event would not work if the server channel selected to generate the event (which must be a server running on the same PC as MantisClient) was not the first channel listed on the channels tab AND any channels listed before the selected channel were unassigned to a server.
8. RN 121107-000005 – Previously when the Shadow plug-in was set to provide two shadow maps, then only Gouraud shading or Light Mapping shade modes could be used. This restriction is now lifted so that additional shade modes such as bump mapping are now allowed.
9. RN 121203-000002 – Added new Cigi controls to the CigiCCL and CigiV2 plug-ins to allow host control of the following entity clamping parameters: type, altitude, length, width and mass.

3.1.1 BID 108B Notes

Updates/Additions

Advanced Weather plug-in:

1. RN 120817-000001 – Added the ability to correctly sort volumetric cloud layers at altitudes that cause them to intersect with terrain such as mountains. This feature only works if the 32 bit float depth buffer method is selected. Previously this method required GLInterceptor to be installed and so would not work on non-IDX systems. As part of this update also modified Mantis to not require GLInterceptor to support 32 bit float depth buffering.

2. RN 120824-000002 – Added 'High Bit Precision Rendering' checkbox to AdvWeather plug-in. When checked a 16 bit float render buffer is used to render the clouds to. This significantly reduces banding artifacts that are seen particulalry when flying through the cloud layer or rain squall. Modified the way the clouds and storm are rendered to eliminate flickering artifact caused each time the view passes through one of the volumetric slices making up the effect.

Deficiencies Addressed

1. RN 120823-000000 – Fixed problem with BoeingGDC distortion correction if enabled at start up and other plug-ins that use FBO's are enabled(e.g AdvOcean and AdvWeather). The output image would get squashed into a corner.
2. RN 120824-000001 – Fixed a problem with the screen turning all white when EasyBlend distortion correction is enabled and certain plug-ins are also enabled, e.g. Volumetric cloud plug-in (only when view is inside or above cloud layer) and Viewport Effect plug-in (only certain effects).

Known Issues

1. RN 070517-000002 – When a rotorwash effect is attached as a child to a normal top-level entity, the parent X/Y/Z offset in the Rotorwash EntityControl packet does not have any effect on the relative position of the rotorwash effect. The rotorwash effect is always centered at the centroid (0,0,0) of the parent model. This behavior is inconsistent with other types of entities, including normal model entities, and other special effect entities like particle and DIGuy effects which can be positioned relative to their parent model using the offset values. To work around this limitation, create an intermediate entity using the file empty.vt as a child to the parent, and then attach the rotorwash effect to the empty model. This entity can then be positioned relative to the parent.
2. RN 080328-000004 – The MnpViewer application reacts slowly and may have problems functioning on some Independence IGCs.
3. RN 080504-000001 – When using CIGI Component Controls to enable or disable the statistics display in Mantis, statistics level 3 is not enabled or disabled. Other statistics levels operate correctly via CIGI.
4. RN 080515-000009 – When the CIGI log playback is paused and then resumed using play, the time value resets to 0.0 seconds. The progress continues where it left off with the correct CIGI log percentage instead of the number of seconds from the beginning of the log file.
5. RN 080616-000004 – When Mantis Client based server licenses are enabled, the Mantis Server will initially print a License Failure message. The client based server license will be detected when the MantisClient loads an MPF file with a Primary IP Interface and Discovery Port that matches the server, or when the user clicks the Discover button on the Mantis Client.

3.1.0 BID 1082 Notes

Updates/Additions

1. RN 120608-000003 – Made following changes to Mantis GUI's:
    - "Plugins" tab renamed Add/Remove Plugins.
    - Added new "Plugin Pages" tab which contains all the plugins tabs as sub tabs (except CigiCCL and Cigi2 plugins which remain at top level). This prevents GUI from getting very wide when using multiple plug-ins.
    - Start/Stop button removed and replaced with a Start/Stop menu bar item.
    - Modified font to use a Cleartype font which supports anti-aliased text.
    - Updated GUI items to use XP style controls.
    - Content->Pacing Tab is now exposed by default (previously required an environment variable to expose it).
    - Added message log severity filter check boxes on Mantis Client.
2. RN 120717-000000 – Added the ability to drop any OpenFlight or VTree format model into the scene in Mantis to rapidly test for correct appearance and functionality. Added ability to control stealthing operations using a joystick. Modified search mechanism used by Mantis for .vt files. Previously would only load from cache folder, now will use absolute path first, look in cache folder second, search path specified by VTreeTexturePath third.:
3. RN 120717-000000 – Increased the number of Stealth tab waypoints up to 100 and added option to give each waypoint a name.
    Changed the names of entities added by Cigi to include the name of the model, e.g. Entity4015<A10Thunderbolt> rather than just Entity4015. These names get listed in the Attach to stealth drop down as well as in some plug-ins.
4. RN 120727-000002 – Added support for Boeing GDC (Geometry Distortion Correction) as used on the Boeing CRVS displays.

Deficiencies Addressed

1. RN 120608-000002 – Fixed warning message of type "Cache size for lod N was <X>MB, now capped at 20MB". Previous code greatly over estimated size of cache required and was stuck at assuming available texture memory was the size it was on old GPU's. Fixed .cch file creation to write the correct texture name (e.g. 1024x1024.dds) rather than just <add_tex_name> for each texture cache entry.
2. RN 120717-000002 – Fixed slight performance overhead introduced in incident 120314-000004 when nothing is enabled to force use of shaders except for dithering. As a side effect this same issue also caused the warning message for some textures that could not be found to be displayed repeatedly.

igStats plug-in:

1. RN 120625-000001 – Improved igStats plug-in:
    - Now logs more stats including view position, poly count, light point count, texture memory, etc.

- Added column header line for importing into Excel as space delimited file.

ChannelPIP plug-in:

1. RN 120620-000002 – Fixed problem with ChannelPIP plug-in whereby any PIP window would disappear if it's parameters were modified from the GUI. This problem only affected IDX systems.

Advanced Weather plug-in:

1. RN 120717-000001 – The feature added in 3.0.6 to keep the AdvancedWeather cloud layer dense in regions where there are storm clouds could make performance very bad if the weather texture dimensions were set too small. Modified the code so that if there are too many pixels that need to be updated then the 'dense cloud in storm region' functionality is automatically disabled. This prevents very slow performance when bad values are set in the advanced weather plugin.

AdvancedOcean plug-in:

1. RN 120611-000001 – Fixed problem with ocean and inland water reflections not being blurred correctly when inland water reflections and shadow mapped shadows are both enabled.

NVG:

1. Fixes for low light conditions (air glow).

3.0.7 BID 1077 Notes

Updates/Additions

AdvancedOcean plug-in:

1. RN 120203-000001 – Added additional checkbox to Advanced Ocean plugin 'Occlude Terrain' feature to force regular depth buffering to be performed at all view altitudes, not just when view point is below the maximum wave height. This can be used to fix sorting issues when parts of the terrain extend below the sea surface - such as bridge supports, harbor walls, etc.

IData plug-in:

1. RN 120416-000001 – Updated IData plug-in to use the IData 3.1.0 SDK. This version of IDATA contains official support for 64 bit run time.

Deficiencies Addressed

1. RN 111220-000002 – Detailer 3.0.5 updates:
   - Restore original behavior of editing VT for scripts and collision segments
   - Multiple fixes to model selection UI to keep in sync with CIGI data, property lists, and render window.
   - Removed "Remove" buttons from most tabs
   - Refresh existing DOF, switches, and lights from current scd even when VT changes.

2. RN 120111-000000 – Backed out the change to allow Client and server to be in two different sessions on the same PC as this was causing access rights issues so would fail on some configurations.
3. RN 120411-000001 – Fixed issue with SpliceTree crashing when node preview window is opened on a system that has GSync and the VTREE_ENABLE_GSYNC environment variable is set.
4. RN 120413-000005 – Collision segments in an entity that is attached to another entity would previously inherit the collision enable state from the parent. So if any of the entities ancestors has collision detection disabled, then the entities collision segments would also be disabled. However, this was not always the case depending upon the order that certain operations were performed. The CIGI specification does not define this inheritance, nor does it really make sense. It might be desirable to have an attached entity perform collision detections but not detect collisions with the entities it is attached to. This inheritance has therefore been removed.
5. RN 120416-000000 – Fixed problem with change in render order introduced in 3.0.5. Prior to this release entities whose altitudes were set below -1000m were rendered before the terrain. In 3.0.5 this changed such that the terrain was always rendered first. This is now fixed to restore the previous render order between terrain and objects placed below -1000m.
6. RN 120430-000002 – Fixed problem with MFP channels typically have a small window size. This means that Continuous Model Scaling (CMS) gets exaggerated on these channels as it tries to maintain a minimum pixel size for the model. This means that mission functions on the model use the exaggerated size and therefore return incorrect results. CMS is now disabled on non-rendering channels.
7. RN 120511-000000 – Light points get raised vertically by their radius in order to prevent z-fighting with the surface they are on. If a .vt terrain was used and the projection was set to geocentric the light points were getting moved in the wrong direction (sideways or downwards). This issue is now fixed.
8. RN 120518-000002 – Fixed problem with Detailer not loading plug-ins such as DiGuy and AdvOcean since version 3.0.0.

DiGuy plug-in:

1. RN 120518-000002 – Fixed issue with DiGuy plug-in hanging at startup when loaded in Detailer since switching to DiGuy10.

RotorWash plug-in:

1. RN 120509-000001 – Fixed problem with rotorwash effects being rendered high in air when shadows are enabled with large caster radius.

RunwayFX plug-in:

1. RN 120413-000001 – Fixed issue with light point reflections on RunwayFX getting reflected off any surface rather than just the wet parts of the runway. This issue was introduced in 3.0.6.

Shadow plug-in:

1. RN 120521-000004 – Fixed problem with Shadow plugin where the shaders would not compile in the following circumstances: Cascaded Shadow Maps enabled and Dithering disabled, or Cascaded Shadow Maps enabled and Soft Shadows disabled.

AdvancedOcean plug-in:

1. RN 120215-000004 – Fixed problem with occasional incorrect colored pixels on Advanced Ocean plug-in polygons that are viewed at a very oblique angle.
2. RN 120424-000004 – Fixed a problem where when looking through the bowspray of one ship at another ship, sometimes the wake effect of the other ship would disappear in the region where the bowspray of the first ship is rendered.
3. RN 120510-000001 – Fixed problem when using shadow mapped shadows and scene reflections in water, if the reflections LOD scale was set non zero then the shadows would be rendered using that scaled LOD. This would cause the shadows to suddenly change as you approach an object.
4. RN 120510-000002 – Fixed problem on Advanced Ocean plug-in bowspray effect. Sometimes one or more bowspray particles would be ejected way further than they should be. This typically occurred when there was a frame rate glitch or the ship they were attached to was moved by a few meters (as happens in some of our demos).
5. RN 120203-000001 – Fixed problem in UTM mode that stopped the automatic enabling and disabling of the Advanced Ocean plug-in 'occlude terrain' feature based on view altitude from working correctly.

3.0.6 BID 1066 Notes

Updates/Additions

1. RN 120214-000003 – In order to increase the portability and ease of setup of .mpf files on non-idx systems the following auto-configuration of channels is now performed when loading an mpf on a non-idx system:

   - If a channel is unassigned or assigned to a server that is not online then it is assigned instead to the first online server that is not already assigned to any other channel.
   - If there are more channels defined in the .mpf than there are online servers, then all excess channels are set to unassigned.
   - If there are more online servers than there are channels, then a channel is created for each online server that has not already been assigned. This is only done if the first 8 characters of the server name match the first 8 characters of the channel 0 server name, this is to allow different IGs to exist on the same network by having at least one of the first 8 characters in the server name different. These new channels will inherit the properties of the first channel, with the exception of the channel heading. The heading will be set such that the first channel is straight ahead, second channel is right, third left, fourth right of right, fifth left of left, etc. to create a panorama.
   - The user can modify and save the properties of these created channels if desired to suit the particular display setup.

2. RN 120228-000003 – Added method to allow more than 4 MantisServers on a PC. Previously limit was 4 servers per PC due to the limitation on values for the tcpPort command line option.
   To use more than 4 servers define the environment variable MantisComPort=14992 on both server and client PC (if Client is on separate PC). Then assign tcpPort values starting at 15004 and incrementing by 1 each time. This will allow up to 100 channels on a single PC provided you set up the corresponding number of IP addresses.
   Note this is mainly for debug purposes. Erratic performance of the PC may occur when using many channels..
3. RN 120228-000004 – Increased supported number of CIGI Channels. The Cigi 2.0 spec defined a limit of 8 view Groups and 32 ViewIDs. This meant that more than 32 channels cannot be defined.
   Cigi 3.2 allows up to 256 View Groups and 65536 ViewIDs. However, The CigiCCL plugin was still limiting these values to the Cigi 2.0 limits. Increasing to the full allowed amount for Cigi 3.2 would create memory and performance issues. Compromised by increasing limit to 16 view Groups and 128 ViewIDs. This should allow for up to 128 channels to be used.
4. RN 120322-000006 – Added option to MantisClient->Channels->Layout tab to enable/disable raising of light points by their radius. Until now Mantis has always raised light points by their radius to minimize z-fighting artifacts with the terrain. This option allows the raising to be disabled for non-morphing lightpoints which may be required in applications where accurate alignment of the light point with an object is desired.
   Also made the following unrelated GUI clean-up changes:
   - Renamed Channels->Layout->Allow Dithering checkbox to "Enable Dithering".
   - Removed Environment->Sky->Dither checkbox. Sky dithering is now just enabled by the Channels->Layout->Enable Dither checkbox.
   - Removed the General->Graphics->Alpha Enable and Alpha Type controls which have had no effect for years.

Deficiencies Addressed

1. RN 120113-000003 – Fixed bug whereby for UTM terrains with a latitude origin in the southern hemisphere the ephemeris model would incorrectly use instead a latitude in the northern hemisphere of (90 - origin latitude).
2. RN 120214-000002 – Fixed problem introduced in 2.9.2 that stopped terrains with non-contiguous regions from loading correctly.
3. RN 120314-000004 – Dithering to reduce banding artifacts is only possible when using shaders to render. Previously under the following conditions shaders would be disabled: Terrain color correction = 1.0,0.5,1.0 (only applies for terrain), shadow receiver disabled, cloud shadows disabled, layered fog disabled, terrain city glow disabled, texel feathering disabled (only applies to terrains). So if all these were true then banding would be evident.
   Modified logic so that shaders will always be used if the Channel->Allow Dithering check box is checked.

As part of this also fixed the following two issues:

1) Fixed a MantisServer crash that would occur under some sequences of changing shader usage. e.g Start with Layered Fog off and Terrain City Glow set to 0.5, then enable Layered Fog and set Terrain City Glow to 0.0 at the same time. Then go back to Layered Fog disabled and Terrain City glow 0.5 at the same time. A crash would occur. This problem was introduced in 3.0.0.

2) fixed problem with some shader effects not working if certain sequences of enabling and disabling effects were performed. This problem has always been present.

4. RN 120320-000001 – Fixed problem with Python scripts that use mmap functions introduced in 32 bit Mantis 3.0.0. The problem would cause the script to fail to load.
5. RN 120321-000007 – Fixed problem with all spotlights in scene being disabled when disabling an entity that has another entity attached. Should only disable spotlights that are attached to the attached entity.

RunwayFX plug-in:

1. RN 110404-000006 – Added option to RunwayFX plug-in to reflect the actual scene rather just a generic environment map. This feature relies upon the AdvOcean plug-in to create the reflected scene. Therefore to enable this feature you must also have the Advanced Ocean plug-in loaded and enable scene reflections for inland water. The reflection height should then be set to the altitude of the runway surface.

AdvancedWeather plug-in:

1. RN 120216-000000 – Fixed a problem with AdvWeather plug-in storm clouds in that previously they had to be carefully placed such that they were above a region of the weather texture that is fully dense with cloud.
   Modified plugin to update the weather texture underneath the storm cloud to automatically make it fully dense.
   This allows storm clouds to be placed anywhere and also allows the 'Weather Speed' value to be set non-zero to allow the weather pattern to drift.

AdvancedOcean plug-in:

1. RN 120322-000005 – Fixed a bug introduced in Mantis 3.0.4 patch 10 which meant that light point reflections would not get rendered when using the RunwayFX plug-in.

AAW plug-in:

1. RN 120320-000002 – Fixed a bug in the original Aircraft Arresting Wire (AAW) plug-in implementation which meant that the arresting wire material was not getting set up. By chance on Mantis 2.4.6 it looks OK, but in 3.0.5 the arresting wires appear black without the fix.

3.0.5 BID 1047 Notes

Updates/Additions

None

Deficiencies Addressed

1. RN 100913-000003 – Fixed issue with file reads past EOF not being handled correctly.
2. RN 111109-000000 – Fixed warning errors (e.g. igHostPartSysFx::SyncStop(): failed to stop fx) being generated when an FX is stopped when in certain states.
3. RN 111220-000002 – Modifications to Detailer utility. Most changes were related to cleaning up inaccurate CIGI ID assignment and not changing assignment in the scd files when models are updated. Some functionality related to writing back scripts and collision segments/volumes into VT files has been removed. This functionality should now be implemented using comments in the OpenFlight model. Numerous miscellaneous bugs were also addressed.
4. RN 111221-000000 – Fixed to render alpha polygons with transparency on VLOS attached entity when near clip override is enabled.
5. RN 120111-000000 – Fixed a problem which prevented more than one MantisServer from running on the same PC as the MantisClient. Also Fixed to allow MantisClient and MantisServer to run in different sessions on the same PC. This allows, for example, the MantisClient to be run using a Remote Desktop Connection on to the PC. The Servers must be run local as processes running on RDP connections cannot access the local desktop.
6. RN 120201-000002 – The following improvements are now implemented for the narrow field of view terrain paging center offset:
   1) Only use a single isector per frame, was three isectors per frame. This reduces CPU load.
   2) Movement of the paging center is now filtered to reduce oscillations.
   3) Unthrottling of paging on hyperjump is disabled on narrow FOV channels. This fixes issues with the unthrottling cutting in when the view direction changes quickly, with subsequent glitches in rendering.
7. RN 081113-000018 – Fixed the Mantis sky model diurnal cycle calculation to use the sun elevation above the real horizon rather than the sun elevation above the artificial horizon at the far clip plane. This would cause the scene illumination to change erroneously as the view altitude is increased or the far clip plane is adjusted.
8. RN 111007-000000 – Fixes for spot light fog illumination:
   - Modified fog illumination to roll off with range^4 rather than just linearly with range. This gives a much more natural looking effect and doesn't over illuminate the fog like it used to.
   - Capped the maximum brightness the fog could be illuminated by spot lights.
   - Ramped down the effect during the day.
9. RN 111121-000000 – Modified 2D cloud layer rendering to disable the near clip plane. This makes the clouds get drawn right up to the view point so you never see the clouds only covering a portion of the screen as you transition the cloud surface.

10. RN 111123-000001 – When there is a sky dome enabled (such as the ViXsenSkyDome on sensor channels) and AdvancedOcean scene reflection is enabled and the view is below a cloud layer (either 2D or 3D) then the sky dome was getting rendered after the clouds which caused the clouds to either disappear in the case of 2D clouds, or look really bad in the case of 3D clouds.
11. RN 111130-000001 – Fixed problem that occurs when layered fog is enabled and the eye point is inside a 2D cloud layer. Increasing the layered cloud visibility range would cause the visibility to increase up to a certain point and then start to decrease. Modified the way the calculation of visibility between 2D cloud layers and layered fog is performed to make the results more consistent.
12. RN 120119-000007 – Fixes to make Mantis more usable on standalone systems. Made following changes which only apply when Channels->Raise flag is checked:
    1) Cursor is initially disabled when mouse is over output window.
    2) Output window is made always on top so that task bar gets hidden.
    3) Mouse clicking on the output window disables always on top. Note - You will not be able to make another window appear on top of the output window until you have clicked on the output window.
    4) Each time the output window is clicked on it will toggle the visibility of the cursor.
13. RN 120131-000002 – Fixed problem with terrain always rendering on top of 2D cloud when viewed from below. This meant that 2D cloud did not appear to intersect mountains. Modified render order to render the opaque terrain pixels before rendering the 2D cloud so that the intersection appears correct. Also, transparent terrain pixels that are above the bottom of the 2D cloud are now clipped and not rendered.
14. RN 111109-000000 – Fixed bug whereby when an attached effect was set to entity inactive state the effect was paused and remained on the screen. Modified to instead stop the effect which causes the effect to disappear.

RunwayFX plug-in:

1. RN 120125-000000 – Fixed problem with the RunwayFX shaders getting re-compiled many times over when layered fog or cloud shadows are enabled. This was making the enable take longer than necessary.

AdvancedOcean plug-in:

1. RN 120203-000001 – Added 'Occlude Terrain' check box and Cigi control to Advanced Ocean plugin to allow the terrain and ocean to be sorted by regular depth buffering rather than the terrain always rendering on top of the ocean. This mode can be used for ship based simulations so that the terrain will not be visible through waves.
2. RN 111214-000000 – Fixed problem on ViXsen channels with inland water being visible when view is in a 2D cloud layer.

VolumetricCloud plug-in:

1. RN 111123-000003 – Fixed problem on ViXsen sensor channels when the eye point is inside a 2D cloud layer. The scene should all be fogged out but the 3D vol cloud layer was not and remained clearly visible.

CachedFileServer plug-in:

1. RN 111115-000001 – Modified the CFS plugin as follows:
   - Previously, whenever a read failed and a retry was attempted, the CFS plug-in would automatically enable quiet messages on MantisServer. CFS would then spam the message log with quiet messages. This would cause the server to become sluggish and, after a few hours crash due to running out of memory (since the log gets stored in memory). Fixed to cut down significantly the number of quiet messages generated by CFS, and also made it not automatically enable quiet messages.
   - In an unrelated change, also increased the maximum allowed read size when using CFS from 256 blocks (around 5MB with a 20K block size) to 1024 blocks (around 20MB). This will allow for larger textures to get paged.
2. RN 120102-000000 – Redesigned the Cached File Server to fix very slow paging performance seen on some systems where more than one MantisServer is running on a single IGR. This change also reduces the memory usage on such IGR's as only a single cache is now maintained on each IGR. Previously each MantisServer allocated its own copy of the cache. Only one CFS IP address is now required for each IGR, previously a different CFS IP address was required for each MantisServer running on the IGR. Also made some general optimizations to CFS to reduce CPU load.

Custom Symbology plug-in:

1. RN 111208-000003 – Fixed bug in Custom Symbology plugin which caused CIGI Q3D Extension packets with packet type 15 (user data update) to be ignored.
2. RN 111209-000000 – Modified CustomSymbology plugin to reduce per frame overhead if the user dll does not create and use its own OpenGL render context but instead uses Mantis' render context.

Rotorwash plug-in:

1. RN 111221-000001 – Fixed problem with rotor wash intermittently switching to ocean rotor wash when the effect is on terrain that is close to the shoreline.

3.0.4 BID 1031 Notes

Updates/Additions

igVlosHT plug-in:

1. RN 111013-000002 – Added the igVlosHT head tracker plug-in back into the MantisAdons InstallShield. Added support for InterSense IS-900 head tracker to igVlosHT plug-in.

Deficiencies Addressed

1. RN 110922-000000 – Fixed a crash when rendering models that use geometry nodes with multiple primitives indexed.

2. RN 111004-000001 – Fixed problem in VTree with effects getting rendered using the alpha setting for the wrong entity under certain conditions.

3. RN 111007-000000 – Fixed the fog color calculation code to not include disabled spot lights. Also fixed bug whereby fog color calculation was assuming all spotlights are very close to the view point.

4. RN 111007-000001 – Fixed bug in code that duplicates tree for external references which resulted in flashing and OpenGL driver errors. This duplication only occurs if the external ref contains light points flagged as haloed.

5. RN 111017-000004 – Fixed bug introduced in 3.0.0 where uuid in .mpf was always getting set to 0. Also, added capability to ignore uuid when assessing if a reconfigure of the channels in the .mpf is required. This allows the same .mpf file to be used on multiple identical systems that differ only in their uuid. To enable this feature define the environment variable MANTIS_MPF_IGNORE_UUID on MantisClient PC.

6. RN 111019-000002 – When processing LOS isectors the LOD selected on MFP channels was whatever was saved as the last rendered LOD in the .vt file. Fixed to instead traverse all child nodes whose min LOD is less than 0.01. This only affects intersections with entities. Intersection with terrain is unaffected.

RunwayFX plug-in:

1. RN 110929-000001 – Fixed crash issue in RunwayFX and AdvWeather plugins on MFP channels introduced with the multi-threaded MFP functionality added in Mantis 3.0.2.

2. RN 111021-000000 – Fixed a problem introduced in 2.9.4 whereby the runway FX would turn off if either 1 or 3 spotlights are enabled. The RunwayFX effect still worked if two spotlights were enabled.

3.0.3 BID 1013 Notes

Updates/Additions

InstallShields:

- Fixed Mantis InstallShield to have the installable features be 32 or 64 bit version (or both). Added links to 64 bit executables in Start menu.
- Fixed issue with Mantis 64 bit licensing not detecting installed products.
- Fixed MantisAddonsER InstallShield to work on 64 bit OS's.

1. RN 110818-000003 – Added support for NVIDIA GSync frame swap synchronization. This is enabled by setting the server side environment variable "VTREE_ENABLE_GSYNC".

Shadow plug-in:
1. RN 091015-000007 – Added Tooltips to Shadow plug-ins

Deficiencies Addressed

1. RN 110721-000000 – Fixed registry access to use 32 bit registry hive even from 64 bit Mantis. This fixes problems with licensing on Windows 7.

2. RN 110818-000000 – Fixed problem with a faint ghost shadowing of the moonlight where the shadows from the sun fall. This only occurs at dusk/dawn.

3. RN 110830-000000 – Fixed issue with MantisClient crashing and corrupting the .mpf file if you save the .mpf after removing one or more plug-ins. This issue would occur if the .mpf that is first loaded does not contain all the latest properties used by the plugin so the plugin creates additional properties internally.

4. RN 110902-000000 – Fixed problem with general visibility color sometimes getting corrupted when .mpf file is loaded.

Test Pattern plug-in:
1. RN 090109-000001 – Improved Gamma Correction test pattern on test pattern plug-in.

3.0.2 BID 0FFE Notes

Updates/Additions
1. RN 110328-000001 – Added CIGI controls for advanced light point parameters, light point min size and light map intensity.

2. RN 110622-000001 – Added support for server side environment variable VTREE_SMC_NO_ISECTOR which allows a single SMC number to be specified. Any geometry with this SMC will then be ignored when performing intersection testing.

3. RN 110701-000003 – Added capability to multithread mission functions. Added capability to perform mission functions as background processes whilst rendering

if BackgroundMFP sub-product is licensed. Fixed 8.1 stats to better show time take to do the various mission functions. Made stats displayable on MFP channels.

Test Pattern plug-in:

1. RN 110330-000000 – inAdded Sub-Pattern combo box drop down entries for Edge Blend Geometry, Spherically Mapped Dot Pattern, Spherically Mapped Dot Pattern - NoAngles, and Custom 3 test patterns. The sub-pattern drop down allows selection of the combinations of colors used for the test pattern lines.

Deficiencies Addressed

1. RN 110518-000000 – Fixed bug introduced in 2.9.6 and 3.0.1 which can cause MantisServer lockups when a model is displayed that has a continuous animation node.

2. RN 110518-000000 – Fixed problem with only being able to reference the Switch/DOF/Animation controls of the most recently created entity of a particular model type when maps are being used to de-reference the nodes (either by node comments or the drop down in OpenFlight2VTree).

3. RN 110607-000000 – Fixed spamming messages generated when sending fog light component controls. Messages now only display when Verbosity level is set to 1.

4. RN 110607-000001 – Fixed problem with negative channel origin values getting converted to unsigned ints after Apply.

5. RN 100701-000001 – Fixed problem with NVSync not working correctly with multiple servers on a single IGR.

6. RN 110712-000000 – Fixed problem introduced in 2.9.0 that caused bad texture mapping in OpenFlight2VTree if a texture mapping palette is used for 3 point put texturing.

7. RN 110720-000003 – Fixed a bug that got introduced in Mantis 2.9.2 that meant that when using shaders to render Gouraud shaded geometry, the specular material values were being treated as being effectively zero.

8. RN 110720-000004 – The lighting model used in Mantis was different to how it is in the SpliceTree, Audition and Detailer utilities. This makes it hard to preview the models in these utilities and get the materials etc. correct for when the model is run in Mantis. Made all three utilities enable the 'Use Material Diffuse for Ambient' option, and set the lighting ambient to 0.3, lighting diffuse to 1.0, to match how Mantis has them set during the day.

9. RN 110721-000000 – Fixed registry access to use HKLM\Software 64 bit hive from 32 bit apps on 64 bit OS's so that both 32 bit and 64 bit Mantis apps reference the same registry keys.

Advanced Ocean plug-in:

1. RN 081113-000017 – Fixed problem with seams between tiles and channels due to slightly different reference time being used for the ocean state on each IGR under certain conditions.

2. RN 110603-000001 – Fixed problem with render order and stencil buffer usage when rendering trees and grass using RTFoliage plug-in and AdvancedOcean.

3.0.1 BID 0FF9 Notes

Updates/Additions

Implemented native 64 Bit build of Mantis. To use the 64 bit version simply modify your start up script to execute MantisServer.exe and/or MantisClient.exe from the Mantis\Bin64 folder. Note that it is OK to run a 32 bit MantisClient with a 64 bit MantisServer as long as they are both from the same release version.

Upgraded to using Boston Dynamics DiGuy version 10.0.14 for the DiGuy plug-in. Any .mpf file that references DiGuy9.igp will automatically be redirected to load DiGuy10.igp.

1. RN 100108-000001 – Upgraded to using Visual Studio 2008 to build Mantis. IMPORTANT NOTE: This means that when upgrading a system from pre 3.0.1 to 3.0.1 or later the Mantis InstallShield MUST be used on all images in the system. This is in order for the correct Microsoft runtime libraries to get installed on the system.

2. RN 100701-000001 – Implemented IGM Integration for IGR's that have more than one channel.

3. RN 110512-000000 – Added Cigi control to allow per channel date and time setting.

4. RN 110520-000000 – Added new cigi short component control to allow the city glow to be modulated on a per entity basis.

5. RN 110520-000000 – Added Cigi short component control to allow the spotlight color to be set. Note that this currently does not work on the following objects which will still be illuminated with white light: special effects, DiGuy characters, volumetric cloud, all geometry if shaders are not enabled.

6. RN 110520-000000 – Added check box on Channels tab on MantisClient GUI to allow spotlights to be disabled completely on select channels.

Deficiencies Addressed

1. RN 100810-000003 – Fixed bug in code causing crash when .mnx files are used. Added check to ignore SpeedTree referencess in .mnx file. Added MnpExtern application to Mantis InstallShield, this utility may be used to generate a .mnx file for a .mnp which will allow external references to be paged in and out without introducing jitter.

2. RN 110308-000009 – Fixed problem with if IData Overlay sets Line Style, the stats and paging indicator take on this style.

3. RN 110314-000003 – Made improvement in flickering artifacts in 3D clouds when the viewpoint is moving.

4. RN 110329-000001 – Fixed crash problem with setting LACE region size to 256 from host via CIGI.

5. RN 110518-000000 – Fixed Animation Sequence State short component control so that a status Start will reset the displayed frame to 0, and a status Restart will exhibit its current behavior (i.e. start at whichever frame would have been displayed if the animation had been running continuously).

6. RN 110520-000000 – Fixed a bug causing sun/moon illumination to get a ghost shadow of the second spotlight shadow when two spotlight shadows are enabled.

3.0.0 BID 0FD8 Notes

Updates/Additions

1. RN 100602-000000 – Added ability to right click mouse and move up and down to zoom in and out on Show Channels window.

2. RN 100907-000001 – Starting with the next release of Mantis (version 3.0.0) the Mantis licensing will change such that the MantisClientApp unlock key includes a version number encoded it. The license can only be used on versions of Mantis up to and including the specified version number.

3. RN 100929-000002 – When using Mapped Resolution test pattern the Size->Width+Height control now specifies the number of white lines that will be displayed.

4. RN 101123-000002 – Added code to detect if an adapter has had its MAC address spoofed. CgInstall.exe is modified to display "Banned due to spoofed MAC" if such an adapter is selected for UUID creation.

5. RN 101207-000001 – Added a new option on the General->Graphics tab - Spot Lights - Shading Quality. This can be set to either none, per Vertex, or per Pixel. This controls the method used for adjusting the spotlight intensity according to the

orientation of the polygon with respect to the location of the spotlight. It does not affect the per pixel lighting of the spotlight cone.

6. RN 110125-000002 – Modified code to allow a wire-strike enable to be set for each entity via Cigi. Modified code to allow the texture name substring to be set by the server side environment variable MANTIS_WIRESTRIKE_TEXTURE.

7. RN 110128-000000 – Added an IG->Host CIGI packet (Q3D Extension sub-packet ID 18) notifying the host of when the paging mode changes between throttled and unthrottled. This allows the host to know when initial paging is complete and therefore allows the host to, for example, blank the screen at startup or after terrain database change until the local terrain is fully loaded.
   Note - This only works when using the CigiCCL plug-in.

8. RN 110202-000002 – Added the ability for the host to specify a pick mask to use for subsequent LOS requests. This was added to both CigiV2 and CigiCCL plug-ins. This allows the for exclusion of, e.g. clouds, terrain or select entities from testing against the LOS. Also added global 'Enable Intersections' checkbox on the AdvWeather plugin GUI to allow intersections with volumetric clouds/thunderstorms to be enabled or disabled without requiring host changes.

9. RN 110302-000003 – Added new shadow plugin CIGI controls for Position, Receiver Radius, Caster Radius, Max Shadows.

10. RN 110307-000000 – Modified the way that 2D cloud layers are illuminated to make it take account of both sun light and moonlight. Modified the meanings of the 2D cloud controls in the Sky Data Modify CIGI packet to make it more rational and easier to use.

Deficiencies Addressed

1. RN 100526-000001 – Fixed spamming messages and un-necessary file accesses when loading MNP's with SpeedTrees when using CFS.

2. RN 101105-000002 – Fixed problem introduced in 2.9.2 with MantisServers paging thread crashing when switching terrains.

3. RN 101201-000000 – Fixed problem with effects , such as rotorwash, that are coincident with the viewpoint being completely fogged when layered fog is enabled.

4. RN 101221-000001 – Fixed problem with incorrect extension of LOD0 range when Content-Terrain->Extend was checked at start up. The LOD 0 switch range was being extended out to 50000000+FarClip rather than the correct value of FarClip+(OriginalLOD0Range * 0.5). Also, Use of Texture Atlas optimization default changed to disabled as it was using up over 0.6GB of CPU memory.

5. RN 110105-000002 – Fixed problem when using .wwd type terrains. At startup, and after a hyper jump, throttling of the terrain paging is supposed to be disabled until paging stops. This is to significantly speed the initial page in of the terrain in the new location.

Advanced Ocean plug-in:
1. RN 101118-000003 – Fixed problem with the sky being incorrectly fogged in the reflected scene when scene reflection is enabled and viewing from high altitudes. This problem occurred on both inland water and ocean with either range based fog or layered fog.

2. RN 110209-000002 – Fixed a couple of shader compile errors which occur when using Quest hardware and the Fast16Bit render mode with ViXsen.

Advanced Weather plug-in:
1. RN 110128-000001 – Fixed problem with Advanced Weather lightning bolt not being visible when Quest2 is enabled. Also fixed problem with lightning bolt being too dark on ViXsen sensor channels.

igCigi plug-in:
1. RN 101105-000001 – Fixed synchronization deadlock occurring between two threads when unloading an entity when collision volumes are active.

RotorWash plug-in:
1. RN 110201-000001 – Fixed problem with the rotorwash effect being displayed too high off the ground when a large vertical particle size is selected. The particles centers were being raised up by the vertical diameter of the particles rather than the radius. Also added new Cigi control to allow the offset from the ground to be fine tuned and to allow that rate at which effect transitions occur in response to changes in the underlying material.

2.9.6 BID 0FF4 Notes

Updates/Additions
igCigi plug-in:
1. RN 110512-000000 – Added Cigi control to allow per channel date and time setting.

Deficiencies Addressed

1. RN 110518-000000 – Fixed Animation Sequence State short component control so that a status Start will reset the displayed frame to 0, and a status Restart will exhibit it's current behavior (i.e. start at whichever frame would have been displayed if the animation had been running continuously).

2. RN 100810-000003 – Fixed bug in code causing crash when .mnx files are used. Added check to ignore SpeedTree ext refs in .mnx file. Added MnpExtern application to Mantis InstallShield, this utility may be used to generate a .mnx file for a .mnp which will allow external references to be paged in and out without introducing jitter.

igCigi plug-in:
1. RN 110520-000000 – Fixed a bug causing sun/moon illumination to get a ghost shadow of the second spotlight shadow when two spotlight shadows are enabled.

iDataMantis plug-in:
1. RN 110308-000009 – Fixed problem with if IData Overlay sets Line Style, the stats and paging indicator take on this style.

VolumetricCloud plug-in:
1. RN 110314-000003 – improvement in flickering artifacts in 3D clouds when the viewpoint is moving.

2.9.5 BID 0FD4 Notes

Updates/Additions
1. RN 110125-000002 – Modified code to allow a wire-strike enable to be set for each entity via Cigi. Modified code to allow the texture name substring to be set by the server side environment variable MANTIS_WIRESTRIKE_TEXTURE.

2. RN 110128-000000 – Added an IG->Host CIGI packet (Q3D Extension sub-packet ID 18) notifying the host of when the paging mode changes between throttled and unthrottled. This allows the host to know when initial paging is complete and therefore allows the host to, for example, blank the screen at startup or after terrain database change until the local terrain is fully loaded. Note - This only works when using the CigiCCL plug-in.

3. RN 110202-000002 – Added the ability for the host to specify a pick mask to use for subsequent LOS requests. This was added to both CigiV2 and CigiCCL plug-ins. This allows the for exclusion of, e.g. clouds, terrain or select entities from testing against the LOS. Added global 'Enable Intersections' checkbox on the AdvWeather plugin GUI to allow intersections with volumetric clouds/thunderstorms to be enabled or disabled without requiring host changes.

Deficiencies Addressed

1. RN 100526-000001 – Fixed spamming messages and un-necessary file accesses when loading MNP's with SpeedTrees when using CFS.

VolumetricCloud plug-in:

1. RN 110128-000001 – Fixed problem with Advanced Weather lightning bolt not being visible when Quest2 is enabled. Also fixed problem with lightning bolt being too dark on ViXsen sensor channels.

Rotorwash plug-in:

1. RN 110201-000001 – Fixed problem with the rotorwash effect being displayed too high off the ground when a large vertical particle size is selected. The particles centers were being raised up by the vertical diameter of the particles rather than the radius. Also added new Cigi control to allow the offset from the ground to be fine tuned and to allow the rate at which effect transitions occur in response to changes in the underlying material.

Advanced Ocean plug-in:

1. RN 110209-000002 – Fixed shader compile errors which occur when using Quest hardware and the Fast16Bit render mode with ViXsen. This affected inland water and ocean when scene reflection is enabled.

2.9.4 BID 0FD0 Notes

Updates/Additions

TestPattern plug-in:

1. RN 100929-000002 - Added "Sub-pattern" drop down to allow Mapped Resolution pattern to be switched between Horizontal, Vertical, Rotating or Perpendicular.

Deficiencies Addressed

1. RN 101004-000002 - Fixed a few problems with the Short Component Control Dialogue:
   - When the CCL MUT was used in CIGI 2.0 mode, the Component Class dropdown still listed the Cigi 3 classes. Fixed so that drop down lists Cigi 2 classes.
   - The Cigi packet generated had the Cigi version flagged as 3.2 even in 2.0 mode so would not be understood by the CigiV2 plugin. Modified to use a correct V2 packet.
   - Updated the Template drop down list to include all implemented short component controls (excluding deprecated ones).

2. RN 101004-000003 - Fixed problem when rendering precipitation effects using the texture method when two pass Z++ is enabled. Two overlaid and slightly offset images of the precipitation were being rendered.

3. RN 101015-000000 - Fixed following two issues:
   1) If a model contains a DOF with non-zero translations that do not have the X axis set to +X, Y axis set to +Y and Z axis set to +Z then the start up appearance of the model will differ in Mantis to how it appears in Detailer. Subsequently

sending an articulated part CIGI control would fix the issue. This is now fixed so the model now looks the same at start up in Mantis as it does in Detailer.
2) If a moving model has shadow geometry and contained a switch control, a seperately named switch was required in the main geometry and the shadow geometry and the host had to set them both. This should not be required, it should be possible to have the same named switch in both geometries and have them both set with a single GIGI control. This was already the case for DOF controls, and the code was written for switch nodes but a bug caused it to not work. This is now fixed.

4. RN 101105-000002 - Fixed problem with MantisServers paging thread crashing when switching terrains.

5. RN 101201-000000 - Fixed problem with effects , such as rotorwash, that are coincident with the viewpoint being completely fogged when layered fog is enabled.

6. RN 101221-000001 - Use of Texture Atlas optimization default changed to disabled as it was using up over 0.6GB of CPU memory.

7. RN 110105-000002 - Fixed problem when using .wwd type terrains. At startup, and after a hyper jump, throttling of the terrain paging is supposed to be disabled until paging stops. This is to significantly speed the initial page in of the terrain in the new location. This unthrottling works when using a single .mnp terrain, but with multiple .mnp terrains referenced from a single .wwd, the throttling was getting disabled as soon as it was enabled. This lead to long delays in loading the initial terrain.

Rotorwash plug-in:

1. RN 100615-000005 - Fixed problem introduced in Mantis 2.9.0 whereby bit 8 of the CIGI packet component control was being ignored. Also note error in documentation for Rotorwash CIGI packets – the Component State for packets with Component ID 420 and 421 is not NA as previously documented. For both, it has the following effect:

   Bits 0-7: Dispersal Pattern (0 – Single rotor; 1 – LCAC; 2 – Twin Rotor Y; 3 – Twin Rotor X)
   Bit 8: if set, locks the effect to always be external
   Bit 9: if set, locks the effect to always be ownship
   Bit 8: if set, forces Ocean effect (SMC 999) to be rendered using the 998 (inland water) SMC .rmt. This can be used to allow the host to select between two different effects depending on whether the ocean is calm or rough. When calm the inland water effect can be substituted.

2. RN 101028-000002 - Fixed problem with rotorwash effects not getting displayed when either ocean or inland water scene reflection is enabled in the AdvOcean plug-in.

Advanced Ocean plug-in:

1. RN 100927-000002 - Fixed bug introduced in Mantis 2.9.0 whereby the CIGI 3.x standard component control to adjust the water color was only affecting inland water and not the ocean.

2. RN 101008-000000 - The water and foam temperatures specified on the Advanced Ocean plug-in were not being handled correctly. The resultant viXsen IR image showed the ocean/inland water/wake/bow spray significantly colder than the value specified. IMPORTANT: CUSTOMERS ALREADY USING ADVANCED OCEAN IN IR CHANNELS WILL NOTICE THAT THE OCEAN IS NOW BRIGHTER THAN IT WAS AND MAY NEED TO ADJUST THE WATER/FOAM TEMPERATURE DOWN TO MORE REALISTIC VALUES.

3. RN 101020-000000 - Fixed a problem when using true scene reflections on inland water and ocean which was particularly evident at sea states 2 and above. The issue was that where the reflection in the ripple was such that it was reflecting part of the scene below the waterline then the bright blue sky color would seen. Fixed by rendering a skirt in the fog color 'under' the water in the reflected scene so that the fog color would be seen in such cases rather than the sky color.

4. RN 101118-000003 - Fixed problem on AdvancedOcean plug-in with the sky being incorrectly fogged in the reflected scene when scene reflection is enabled and viewing from high altitudes. This problem occurred on both inland water and ocean with either range based fog or layered fog.

RunwayFX plug-in:

1. RN 101012-000001 - Fixed problem with render glitches and MantisServer crashes on the MFP when RunwayFX plugin is loaded and enabled.

Test Pattern plug-in:

1. RN 100929-000002 - Fixed problem with the Anti-alias enable control in Cigi short component control 26 having the wrong polarity i.e. would enable AA when it was false and disable when it was true. Also, when using Mapped Resolution test pattern the Size->Width+Height control now specifies the number of white lines that will be displayed.

2.9.3 BID 0FBA Notes

Updates/Additions

CachedFileServer plug-in:

1. RN 100701-000001 - Added support for Cached File Server with multiple Mantis Servers on a PC. There must be at least as many IP addresses in the CFS IP address mask as there are servers using CFS on the PC.

NvgProjector plug-in:

1. RN 100528-000001 - Added IR Max Gain parameter to NvgProjector plug-in. Added Min Projector Attenuation parameter to NvgProjector plug-in.

TestPattern plug-in:

1. RN 100929-000002 - Added Mapped Resolution test pattern. Added Custom 1, Custom 2 and Custom 3 test patterns which are specific to the channel geometry being used by a particular customer. Modified Mapped Checkerboard test pattern to allow fine control of the rectangle size in width and height separately. Also modified to make MantisGUI changes take immediate effect rather than requiring use of the Apply button which is now removed.

Deficiencies Addressed

1. RN 100815-000000 - Fixed problem with invalid NormalVectorAzimuth and NormalVectorElevation being returned in the CIGI LOS Extended Response Packet.

2. RN 100826-000000 - Fixed problem introduced in Mantis 2.9.2 that causes the fogging to be applied incorrectly when any spotlights are enabled.

3. RN 100910-000000 - Fixed problem with 2D cloud layer visibility always being very dense when layered fog is enabled.

4. RN 100929-000001 - The new Texture Atlas performance optimization introduced in 2.9.2 was using 8k x 8k textures which are not supported on cards older than QuadroFX5600. Fixed to adjust to max supported texture size. Also, the feature is now disabled by default on pre QuadroFX5600 cards.

Rotorwash plug-in:

1. RN 100907-000000 - Fixed a problem with a thin border around each channel where the Rotorwash was not rendered. Fixed a problem with smearing of the edge pixels of the screen. Fixed a problem with the particle billboarding being such that the particles were perpendicular to the LOS of each channel – since each channels LOS is different the particles ended up different shapes on the screen. Fixed this by making each billboard face directly towards the viewpoint. Fixed problem with effects that used veins – the vein generation time was not coherent across the channels. Fixed problem with effect switching in and out of sync across channels when frame overruns occur.

Advanced Ocean plug-in:

1. RN 100815-000000 - Fixed bug in Advanced Ocean normal reporting that meant that normal's were rotated from where they should be dependent upon lat/long. This affected HAT/HOT and LOS.

RTFoliage plug-in:

1. RN 100908-000001 - Fixed problem in RTFoliage plug-in in which erroneous cleanup of material after rendering trees could invoke rendering of an unrelated drawlist.
2. RN 100829-000000 - Fixed problem with SpeedTree geometry sometimes being corrupt. Fixed problem with SpeedGrass causing MantisServer crash. Fixed problem with 3D trees not rendering correctly on ViXsen sensor channels.

2.9.2 BID 0FB0 Notes

Updates/Additions

1. RN 100701-000001 - Multipule GPU support. Made changes to drive each GPU from a separate MantisServer to get two channels from a single IGR (potentially also 4 channels from an IGR if using both heads from both GPU's). Added support for GPU affinity. If MantisServer command line option -displayID <N> is specified, then server will render to only GPU(s) that are generating display <N>+1 as indicated on the Display Properties->Settings tab. All OpenGL rendering windows, including the hidden paging window are forced onto the specified display. This also requires a new version of GLInterceptor Modified Mantis interface to NVSync to allow support for multiple MantisServers on an IGR.
2. RN 100712-000002 - Added support for at least two lights casting shadows at the same time, either sun or moon plus one spotlight, or two spotlights. Also added support for jittering the shadow map to improve appearance. Also fixed bug in CigiCCL plugin not working with the spotlight enable/disable shadow light source short component control.

Advanced Ocean plug-in:

1. RN 100721-000000 - Added support for separate sea state on Inland Water and Ocean to the Advanced Ocean plug-in. Added separate controls to both GUI and CIGI. Old CIGI Short Component Control with Instance ID 0 (or component control with instance ID 6) still updates both Ocean Sea State and Inland Water State to the same value. New CIGI packet with instance ID 40 updates only the Ocean Sea State. New CIGI packet with instance ID 41 updates only the Inland Water State.

Deficiencies Addressed

1. RN 100326-000000 - Fixed problem with CachedFileServer crashing under certain conditions.

2. RN 100430-000000 - Fixed bug introduced in 2.9.0 that caused shadows of .pmm textures with alpha such as trees not to work in ViXsen. The cast shadow would be the whole polygon rather than just the opaque part of the polygon.
3. RN 100519-000000 and RN 100519-000001 – Fixed problem with texture atlas optimization and enabled by default.
4. RN 100628-000002 – Modified particle effects to randomize particle twist when in burst mode. Previously all particles in an effect were getting the same twist value which gave a very unnatural appearance. Modified code to start each particle off with a random twist and to randomize the twist rates by +-10%.
5. RN 100720-000000 – Fixed problem with depth buffer compare function being changed from GL_LEQUAL (correct) to GL_LESS (wrong) when fading entities are rendered in their fade transition state. This incorrect setting then persists forever after. This caused the RunwayFX effect to be rendered but not pass the depth test so does not appear.
6. RN 100720-000005 – Fixed problem with precipitation effects jittering when view point velocity is close to wind velocity and the wind velocity is high. Added some filtering on frame period and view point velocity when calculating view relative precipitation velocity.
7. RN 100810-000003 – Modified support for runtime paging of external references such as airfields to reduce or eliminate glitches in the render time. This will also require some Celerity modifications to add additional info to the .mnp file before it will become active.

NvgProjector Plug-in:

1. RN 100528-000001 - On NvgProjector plug-in changed (IFS+RGBB XXXX) command to new (RGB+RGBB XXXX) command as required by latest Christie Matrix Stim projector firmware. Increased sensitivity for when new (RGB+RGBB XXXX) command is issued as old command only had an effect if it was changed by 4 or more but new command has an effect if it is changed by 1).

RotorWash Plug-In:

1. RN 100804-000000 – Fixed problem with the rotor wash effect not orientating correctly with geocentric terrains when using non circular dispersal patterns.
2. RN 100804-000000 – Fixed the issue that rotor wash effect did not handle the orientation correctly for geocentric terrains. Have added logic to address this case.

VolumetricCloud Plug-In:

1. RN 100817-000003 – Fixed problem that if lightning is enabled and an Advanced Weather storm cloud is being illuminated by a different number of spotlights than the cloud layer, then the lightning illumination of the storm cloud would get stuck on for the entire period in between lightning strikes.

2.9.1 BID 0FA1 Notes

Updates/Additions

1. RN 100528-000001 - Added electronic blend enable/disable to blinders enable/disable sequence for NvgProjector plug-in.
2. RN 100618-000001 - Implemented scene reflections on inland water.

Deficiencies Addressed

1. RN 100615-000005 - Fixed a problem with rotorwash not detecting inland water material code.
2. RN 100621-000001 - Fixed problem with cigi control of certain sky model parameters

2.9.0 BID 0F9D Notes

Updates/Additions

1. RN 100128-000000 - Added support for 3 spotlights/omni lights/flares (hence forth just referred to as spotlights) on terrain, entities and advanced ocean. Previously in Mantis the number of spotlights was limited to less than this when certain features were enabled such as detail texture, cloud shadows and object shadows
   Mantis has now been fixed to support 3 spotlights on the terrain, advanced ocean, inland water, and entities under all conditions (except ViXsen which does not support spotlights at all).
   In order to use three spotlights on terrain with detail texture then the shader rendering path must be enabled (e.g. by enabling texel feathering or setting the terrain color correction to non-default values). The fixed function rendering pipeline still does not support 3 spotlights and detail texture and generates un-predicable results when this is attempted.
   As part of this effort, support for the old 'Quality' spotlights has been dropped. If a quality spotlight is selected then the performance implementation will be used instead.
2. RN 100318-000001 - Added GUI option to select between the old two pass Z++ method or the Floating Point Z buffer
3. RN 100323-000002 - Integrated EasyBlend distortion correction and channel blending toolkit. Added drop down on Channels->Layout tab to allow selection of distortion correction method. Added Scalable Display Technology EasyBlend method to this drop down.
4. RN 100401-000004 - Added a slider to the General->Graphics2 tab to allow the user to adjust the scaling of the polygon offset applied when performing sub-facing. Also modified sub-faced polygons to not write to the depth buffer. This fixes issues with markings showing through the RunwayFX particularly when floating point depth buffering is not being used.
5. RN 100402-000006 – Optimized rendering of plot statistics to reduce the time taken to render. e.g. The time taken to render the 8.1 render stats dropped from 1.8ms to 0.7ms.

6. RN 100430-000000 - Modified the previous 'Hierarchical Shadow maps' algorithm to use instead the Cascaded Shadow Map algorithm which is significantly faster. Facilitates full scene shadows including terrain.
7. RN 100513-000000 - Modified Entity Fog Lights such that the two closest to the view point would also illuminate the terrain, thus allowing them to be used as colored flares.
8. RN 100513-000004 - Many of the shaders used for rendering in Mantis use a dithering technique to increase the apparent color depth from the standard 8 bits per component up to 10 bits per component. However, on channels that are using Quest2 to perform AGC operations on a 16 bit frame buffer this dithering may be undesirable as under high gain the dithering will be visible. As a fix for this added an 'Allow Dithering' checkbox on the Channels->Layout tab to allow dithering to be disabled on particular channels
9. RN 100528-000001 - Created NvgProjector plug-in to control Christie Digital Matrix StIM projector. Also improved VTree's built in halos (note this requires the new vtHalo.int texture which is different than the vtHalo.inta texture).
10. Added methods to detect ownship collision with power lines on terrain. Ownship must be collidable and have bounding volumes defined. Power lines are detected by texture name which must contain "powerline" in the name. Works for the most common bounding volumes in use: bounding boxes, but also works on spheres, and cylinders. Cones do not currently work reliably.
11. Improvements made in the amount of CPU memory used when using inset regions with the World Wide Database.

Quest2 plug-in:

1. RN 100429-000003 - Added user control via Cigi over how large the object is before plugin discards it from tracking.

Advanced Weather plug-in:

1. RN 100219-000000 - Added support for LOS mission functions against the volumetric cloud layer and against storm clouds.

Advanced Ocean plug-in:

1. RN 100223-000001 - Modified ocean plugin to allow independent control of the color of the ocean and the inland water. The old cigi packets will affect the color of both. New cigi packets added for independent setting of ocean color and inland water color.

RunwayFX plug-in:

1. RN 100208-000003 - Modified the HAT/HOT/LOS queries so that if the RunwayFX is enabled and the intersection point is on a polygon with material code 9 or 14 then the runway condition at that point is encoded in the upper bits of the material code.
   The MisionFunctions MUT was modified to decode and display these values for the Extended HAT/HOT and LOS queries.

SpeedTree / RTFoliage plug-in:

1. RN 100318-000002 - Added support for RTFoliage plug-in to scale LODs when using the load management feature of Mantis.
2. 100402-000001 - Performance improvement for rendering the 3D trees.

Viewport Effect plug-in:

1. RN 100407-000001 - Added cigi control for host to update up to 6 floating point parameters for a viewport effect. Added additional cigi control to allow viewport effect to be dynamically enabled and disabled without causing glitches. Added several sample viewport effects.

ChannelMask2 plug-in:

1. RN 100427-000003 - Added short component control for CigiCCL ONLY which allows the selected channel mask on each channel to be individually enabled/disabled from host.

Deficiencies Addressed

1. RN 091110-000002 - Found bug with 4pt texturing not get disabled properly resulting in objects that use regular texturing in the same scene getting corrupted texture mapping.
2. RN 091222-000001 - Fixed issue with Cigi log playback stopping when a File->Update... is performed. Also fixed issue with bogus apply window appearing when the Advanced Ocean or Advanced Weather plugin tabs are selected when the update is performed.
3. RN 100126-000010 - Fixed problem with ALPP parameters appearing different on different tiles of a channel.
4. RN 100201-000002 - The wind speed set in Mantis has minimal affect on effects. Previously each particle will accelerate such that by the end of it's life it will be travelling at the specified wind speed. Since acceleration causes the velocity to increase with a squared law, the particle barely moves with the wind for the bulk of its life. Fixed Mantis so that if the wind speed is set non-zero then the particles will use that speed directly
5. RN 100203-000000 - Fixed occasional crash errors when loading terrains. It was cause by errors reading from disk. That is, the read would fail and return garbage which would later cause a crash. Modified Mantis to retry the read when this occurs.
6. RN 100203-000007 - Fixed problem with z-fighting between the runway markings and the RunwayFX effect that occurred when the runway markings did not have the either material code 9 or 14.
7. RN 100209-000001 - Fixed incorrect display of Z++ (and other) state on Mantis GUI under certain conditions.
8. RN 100303-000000 - Added Height Of Terrain test to storm cloud code so that rain squall and lightning would extend down to the terrain surface rather than down to sea level.

9. RN 100308-000002 - When the view point is close to the base of a storm cloud and is inside the 50 meter altitude band just above the cloud layer then bad sorting artefacts are apparent. Similar issue for rain squalls in the 50 meter altitude band just below the cloud layer. This fix minimizes these artifacts.
10. RN 100310-000001 - Fixed problem with vertical blue line in sky appearing at precisely 3:22am on 6/7/2006 when flying at high altitude above Pendleton.
11. RN 100316-000001 – Performance optimizations: 1) NVIDIA have released a new extension called GL_NV_vertex_buffer_unified_memory in the 185.00 drivers that significantly reduces the CPU overhead of switching between VBO's. This has now been integrated into Mantis. Overall CPU usage was reduced by 10% to 15%. Also in this fix, the Advanced Ocean plug-in to use VBO's and this extension, this significantly reduced the CPU load of the plugin (from about 1ms to about 0.2ms). 2) Implemented a texture atlas technique to reduce the number of texture state changes when rendering terrain. This reduced CPU load by a further 3% or 4%.
12. RN 100316-000003 - Real Time Foliage Plug-In improvements: 1) Related to 100316-000003 – added support for GL_NV_vertex_buffer_unified_memory to improve performance. 2) Modified Near LOD, Far LOD and Fade Distance sliders so that the slider scale is reduced by a factor of 10 when 'Scale ranges by tree height' is checked. This is to overcome the issue of typically having to fiddle about in the lowest 10% of the slider range when this feature is checked. 3) Made all sliders on the plugin update in real time. So as the slider is moved it affects the scene directly rather than having to hit the apply button.
13. RN 100322-000003 - Fixed flickering of trees when they were in their fade LOD range.
14. RN 100331-000001 - Fixed problem with bump mapping of terrain sometimes appearing blotchy when texel feathering is enabled.
15. RN 100331-000002 – Fixed problem with insets into the WWDB that were smaller than 3x3 tiles (12x12 blocks) being rendered as well as rather than instead of the base terrain. The minimum size is now 2x2 tiles (8x8 blocks).
16. RN 100402-000005 - Removed a kludge that was added to the RTFloliage plugin in June 07 that makes all trees get blown by the local positional wind depending on how close the nearest tree is to the eyepoint. Thus as the eye approached a tree all trees in the scene would start to sway. This kludge was added before we properly supported local positional wind. It should have been removed when we added proper support.
17. RN 100419-000001 - Modified AdvancedOcean shader to use texture arrays for whitecaps if supported by the hardware. This makes the whitecaps more distinct in the distance.
18. RN 100419-000002 - Fixed problem with light group intensities not working for ownship when near clip override is enabled.
19. RN 100503-000000 - Fixed the following issues related to accuracy of LOS intersections with Advanced Ocean: 1) The initial intersection estimate of the ISector on the ocean was being done assuming no earth curvature. Modified calculation to include approximate earth curvature. 2) The final ocean intersection altitude was being made assuming perfectly spherical earth leading to errors of up to 100m at a range of 40km. Fixed to use WGS84 oblate spheroid. 3) In regions

where terrain is below sea level the sea intersection was being returned rather than the terrain. Fixed to return terrain intersection instead.

20. RN 100503-000001 - Fixed Layered Fog Ranges to ramp in when inside 2D clouds similar to the non layered fog approach. Also fixed problem with 2D cloud layers created in the GUI then saved to an .mpf. When the cloud is created in the GUI the fogging was working inside the layer. When the .mpf is subsequently loaded fogging no-longer occurred in the layer.
21. RN 100512-000002 - Fixed bug introduced in release 2.8.1. Inland water polygons would not morph correctly causing gaps between the water and the surrounding terrain.
22. RN 100517-000002 - Fixed bug introduced in 2.9.0rc1 in setting up anti-aliased frame buffer objects.
23. RN 100519-000000 - Reverted change in 2.9.0rc1, Q3D_MANTIS_FC_ATLAS now defaults to 0 again as this was causing some issues.
24. RN 100520-000000 – bug introduced in 2.9.0rc1 with layered fog density calculation not correct.
25. RN 100607-000000 - Fixed issue with crashes occurring when using advanced ocean or displaying stats.
26. RN 100608-000003 - Fixed problem with CPU stalling waiting for GPU to finish rendering each time a render bin contains light points.
    Also fixed problem with the vertex array client state not getting disabled correctly after rendering omnidirectional lights. Also some minor performance improvements to the light point code.
27. RN 100609-000005 - Fixed problem whereby terrains that have a 1deg x 1deg size for LOD 0 and whose tile latitude borders are not aligned to exact multiples of 1 degree would have an error in their paging center, which cause the high LOD to not get paged in close to the eyepoint so you continue to see the low LODs.
28. ViXsen - Modulate more reflectance from NIR band into emission. This gives better spatial definition for ntdds files created from MCM source data.
29. Vixsen .ntdds terrain processing in IR spectrum now modulates more NIR intensity for emission output. This results in improved spatial definition for ntdds textures created from MCM source data. Traditional ntdds textures created from OTW are affected to a lesser degree but may experience a slight contrast enhancement.
30. Fixed Mantis so that if the wind speed is set non-zero then the particles will use that speed directly.

RotorWash plug-in:

1. RN 100520-000001 - Fixed problem introduced in 2.9.0rc1 with rotorwash plug-in not not getting rendered correctly.

VolumetricCloud plug-in:

1. RN 100303-000000 - Reduced the overlap between rain squall and terrain to eliminate the hard edge that was being seen. The downside if the squall is not over fairly flat terrain then it may be possible to view under the effect when the eye point is downhill of the center of the squall.

Advanced Weather plug-in:

1. RN 100610-000003 - Fixed problem When using the Advanced Weather plug-in storm clouds that if the general visibility is close enough to cause the storm cloud to start to fog, then the box region surrounding the storm cloud starts to become visible. This is particularly noticeable with dark fog colors.

2.8.3 BID 0F71 Notes

Updates/Additions

No change

Deficiencies Addressed

1. RN 091110-000002 – Found bug with 4pt texturing not get disabled properly resulting in objects that use regular texturing in the same scene getting corrupted texture mapping.
2. RN 100126-000010 – Fixed problem with ALPP parameters appearing different on different tiles of a channel.
3. RN 100201-000002 – Fixed problem with wind does not affect particle effects correctly. The wind speed set in Mantis has minimal affect on effects. Each particle will accelerate such that by the end of it's life it will be travelling at the specified wind speed. Since acceleration causes the velocity to increase with a squared law, the particle barely moves with the wind for the bulk of its life. It is now fixed so that if the wind speed is set non-zero then the particles will use that speed directly.
4. RN 100203-000007 – Fixed problem with z-fighting between the runway markings and the RunwayFX effect that occurred when the runway markings did not have the either material code 9 or 14.

RunwayFX plug-in:
1. RN 100129-000002 – Fixed problem with incorrect fogging of RunwayFX.

2.8.2 BID 0F67 Notes

Updates/Additions

1. RN 091222-000001 – Added support to Mantis for loading .mpu files using a new 'Update...' entry on the MantisClient 'File' menu.
2. Added Cigi2 Short Component Control for Terrain Color Correction.

Deficiencies Addressed

1. RN 091210-000001 – Fixed issue with unlit geometry causing issues with ViXsen shader which resulted in NAN's getting rendered. This caused large white blocks when using Quest2 with LACE enabled.

2. RN 091215-000002 – In Detailer on the Model->Light Groups tab only Light groups assigned to a vtGNode ot vtLPNode were being listed. Fixed to also list Light Groups assigned to vtAGNode and vtGeometryNode node types.
3. RN 091216-000000 – Modified to not use light map shader path during the day when light maps are not visible anyway. This now means that during the day shadows can be cast on geometry that is light mapped. This was not previously possible as light mapping and shadows are mutually exclusive in the shader.
4. RN 091222-000000 – Previously the 'Save As' and 'Exit' menu items on the MantisClient 'File' menu drop down were being made inactive after Start. Fixed to keep them active.
5. RN 100120-000005 – Fixed problem with Voxel Intersection Acceleration code occasionally calculating a negative value as an index into an array which resulted in a MantisServer crash.

Advanced Ocean plug-in:

1. RN 091214-000000 – Fixed problems with sparkles occurring along horizon of Advanced Ocean when using sea states 2 or less.
2. RN 091214-000001 – Enabled dithering on Advanced Ocean shader to reduce banding in dark scenes.
3. RN 100113-000003 –When 2 pass Z++ is enabled the ocean skirt was not getting rendered. This skirt prevents terrain that is 'over the horizon' from being visible through the ocean in geocentric mode. Thus placing the view say 20km from the shore close to the ocean surface and looking at the shore of a mountainous area you would see bits of the mountains through the water.

Advanced Weather plug-in:

1. RN 091217-000000 –On demos where the aircraft to which the spotlight is attached is being viewed from a stealth position, the spotlights do not look good when they intersect the vol clouds. Added check box and cigi control to allow the spotlight effect on the vol clouds to be selectively enabled.

RunwayFX plug-in:

2. RN 100125-000012 – Fixed problem with server crashing when RunwayFX plugin is loaded on a non-rendering channel (e.g. MFP).

Test Pattern plug-in:

1. RN 100119-000007 –Fixed issue with 'Resolution' test pattern having anti-aliasing enabled when rendering alternating pixel wide lines resulting in them getting blurred.

2.8.1 BID 0F4C Notes

Updates/Additions

1. RN 090930-000007 – Added support for Mantis dongle licensing.
2. RN 091015-000007 – Added tooltips for all non-plugin Mantis GUI pages and the following plugins: CigiCCL, RunwayFX, Advanced Weather, Advanced Ocean,

Rotorwash.
3. RN 091110-000002 – *VTree*: Added support for object linear glTexGen application via vtRSNode. This is to allow support for 4 point put texture mapping. Support added to OpenFlight2VTree to read texture mapping entries.
4. Added a throttling capability to the vt file loader. This new function allows the .vt file load to be spread out over multiple frames rather than committing to a single contiguous load which potentially impacts the runtime resource requirements.

Deficiencies Addressed

1. RN 071030-000001 – Removed the limitation information regarding geodetic-only coordinate system support for HAT/HOT and LOS Vector requests. Entity-relative coordinate system is supported with the changes conducted for this incident.
2. RN 090209-000001 – Fixed a typo in multiple error messages that resulted in garbage characters. Message will now properly report the method where the error is occurring.
3. RN 090716-000006 – Fixed occasional MantisServer crash in 2.8.0 caused by uninitialized variable in code added for terrain color correction.
4. RN 090908-000005 – Eliminated spammy superfluous messages about not successfully submitting packet to client thread.
5. RN 091008-000007 – Fixed problem with the display output not updating when using Quest2 if the TestPattern plug-in is also loaded.
6. RN 091008-000008 – When certain effects such as the missile trail are enabled the IGR sometimes completely freezes or reboots.
7. RN 091009-000000 – Fixed problem with the randomization of the animation time offset for each model not working correctly so that all models appeared to animate in sync (e.g. lights on different models would flash in sync).
8. RN 091109-000003 – Fixed problem causing an exception in MantisServer when using the floating point depth buffer implementation of Z++ and Advanced Ocean plugin reflections are enabled.
9. RN 091123-000000 – Fixed jitter on TPOD FLIR and TPOD CCD channels particularly when frame overruns occur.
10. RN 091204-000000 – VTree: The intensity of self luminous polygons that assigned to a light group should change in accordance with the light group intensity. This was only happening if the fixed funtion pipeline rendering was used. Enabling any shader effect such as layered fog, cloud shadows, etc would make the self luminous geometry always have intensity 1.0.
11. RN 091209-000000 – Fixed problem with MantisServer crashing at start when certain plugins (AdvancedOcean, TargetProjectorChannel or RunwayFX) are loaded after the IDATA plugin.
12. Made time plot pan across screen. Changed colors of time pilot lines to make them more distinguishable. Renamed some of the labels to make it clearer what they mean.

Advanced Ocean plug-in:

1. RN 091109-000004 – Previously, the inland water shader gets bound and unbound for each inland water node in the database. This leads to a significant overhead per frame, particularly when lot's of inland water is defined in the terrain (e.g. the Hill Air Force Base terrain). Performance now improved by batching up all the inland water rendering so that it all gets done in one shot after rendering the terrain.

RunwayFX plug-in:
1. RN 090429-000002 – Fixed problem with RunwayFX plugin sometimes not picking up the correct wind speed and direction at startup.
2. RN 091110-000004 – Render time glitches are observed when light mapped geometry first comes in to view. A major render time glitch occurs when the RunwayFX first come in to view.

ViewStabilization plug-in:
1. RN 090625-000003 – Fixes for late ViewStabilization LOS requests: (1) Allowed multiple LOS requests to get queued up and responded to per frame (2) Moved the LOS processing to the start of the frame rather than the end.

2.8.0 BID 0F22 Notes

Updates/Additions

1. RN 071130-000000 – Implemented traversal between MNPs for the World Wide Database. The seam generation process now adjusts existing edge vertices for a smoother transition between disparate gaming areas. The modified vertex locations are stored in the supplemental mnps file and are integrated during the runtime loading process.
2. RN 090714-000005 – Added MantisClient GUI control to allow user setting of the minimum light point size used by Advanced Light Point Processing. This was previously hard coded at 3.5 pixels.
3. RN 090716-000006 – Added sliders to the MantisClient General → Graphics2 tab to allow user control of Terrain Color Correction. Sliders are provided for Gain, Level and Saturation.
4. Integrated slider/toggle controls for the dynamic morph range functionality. The controls can be found within the MorphDialog.

RunwayFX plug-in:
1. RN 090429-000002 – Implemented Level D runway special effects.
2. RN 090915-000001 – Fixed problem with spotlight 0 not appearing sometimes when cloud shadows are enabled.

Advanced Weather plug-in:
1. RN 090429-000003, 090429-000004 – Implemented volumetric thunderstorm cloud effect, volumetric rain squall effect, lightning for volumetric thunderstorms, and lightning strike reporting to host via cigi.
2. RN 090429-000005 – Precipitation effects. Added user tuning controls for appearance of precipitation effects. There is a new Cigi 3 component control

(Atmosphere, Component ID 4) to control the new tuning parameters and provide finer control of the precipitation rate.

3. RN 090828-000001 – Added patchy fluctuation effect for Advanced Weather layered fog. Implemented an approximation for patchy ground fog when using the layered fog feature of the Advanced Weather Plugin. FAA Level D requires a patchy effect for ground fog. This is now achieved using a similar method to how scud is simulated on the 2D clouds. There are two new controls on the Advanced Weather plugin Layered Fog panel, Variation Magnitude and Variation Frequency which control the application of this effect.
4. RN 090925-000003 – Fixed problem with lightning bolts being rendered black under certain conditions.

Deficiencies Addressed

1. RN 080104-000002 – Fixed issue with textured precipitation showing seams on tiled systems.
2. RN 090326-000002 – Fixed problem with intermittent lock up when loading new .cfg files - particularly in MissionFunction MUT. Fixed the other problem mentioned in the incident with the Fly MUT generating an exception sometimes when loading a new .cfg file.
3. RN 090417-000000 – Fixed problem with the self illuminating geometry not illuminating at night when advanced shaders are active (e.g. when using texel feathering, cloud shadows, shadows, etc.).
4. RN 090714-000007 – Removed the field next to "Enable near-clip override" under the General → Graphics tab in MantisClient as its value was not used.
5. RN 090722-000003 – Fixed problem with offset coordinates of attached entities getting corrupted under some conditions.
6. RN 090731-000001 – Fixed two issues with clouds: (1) If a 2D cloud layer is defined in the .mpf (rather than later via cigi) then it does not get initialized to the correct radius. This results in issues with it not moving at the correct rate as the eye point moves. This becomes particularly apparent when using the new Advanced Weather Thunderstorm clouds with a 2D cloud above them. You get weird parallax effects as the eye point moves. (2) If the Far clip plane is closer than the horizon then the incorrect radius was being calculated for the sky model. This resulted in clipping issues with the far clip plane. This was particularly apparent when using the new Floating point Z++.
7. RN 090831-000000 – Previously bump maps always used the texture coordinates of the base texture. Particularly on pavement like runways etc. it would be desirable to be able to make the bump map texture use the texture coordinates of the detail texture. This fix makes this possible by allowing the bump map texture to be specified in the .q3dtd file using either:
   - BumpMap = "<filename>" → To specify a bump map texture that uses the texture coordinates of texture layer 0 (the base texture).
   - DetailBumpMap = "<filename>" → To specify a bump map texture that uses the texture coordinates of texture layer 1 (the detail texture).

8. RN 090831-000001 – Fixed problem WRT to all the stars disappearing when viewing in certain directions.
9. RN 090908-000005 – Fixed problem with erroneous error messages being generated when running in async cigi mode.
10. RN 090918-000000 – Changed Light Group Intensity cigi control to modify light alpha rather than rgb intensity when Advanced Light Point Processing is off. This is to stop the lights turning black at low intensities. When ALPP is enabled this is not an issue as we accumulate the light into the framebuffer rather than blend it.

Advanced Ocean plug-in:

1. RN 090429-000000 –The advanced ocean shaders are modified such that the following parameters can be changed without needing to recompile the shaders and can thus be updated at run time without glitching the frame rate: wave height scale, wind direction, environment map intensity, whitecap adjust, sea level, environment map texture.
2. RN 090712-000002 – Fixed bug whereby wakes and bowspray were not being rendered when viewed through transparent geometry on ship.
3. RN 090813-000002 – If Rendering is disabled on a channel (e.g. on an MFP channel) then all HAT/HOT/LOS queries performed on that channel on the Advanced Ocean would return NAN's.

Advanced Weather plug-in:

1. RN 090429-000001 – Cloud layer thickness can now be changed without incurring a render glitch.
2. RN 090616-000001 – Advanced Weather lightning strikes generate lightning response packets to host. Note: Responses for lightning strikes generated by the AdvancedWeather plugin will have the Entity ID field of the response packet set to 0xffff (65535) since they are not associated with a storm entity.

2.7.0 BID 0EEF Notes

Updates/Additions

1. RN 090603-000002 – Added support for HiRes composited projector support using multiple IGR's in a single channel.

Deficiencies Addressed

1. RN 090116-000004 – *VTree*: Workaround a strange limitation in fwrite when writing a buffer greater than about 64 megabytes over the network in Windows.
2. RN 090609-000008 – *VTree*: Fixed problem where OpenGL stereo would get disabled when advanced weather plugin volumetric clouds were enabled.

Advanced Weather plug-in:
1. RN 090512-000003 – When refuelling inside the volumetric clouds any parts of the scene closer than 5 meters is completely unobscured. A sharp threshold then occurs whereby objects beyond 5 meters are heavily fogged

IData plug-in:
1. RN 090512-000004 – IData plugin was not clearing the vertex buffer setup before calling into IDATA. This could cause unintended interaction between VTree and IData.

IGM plug-in:
1. RN 090521-000001 – Fixed glitches that were occurring when enabling / disabling video output via cigi.

2.7.0 RC 1 BID 0ED3 Notes

Updates/Additions

1. Fixed problem with self shadowing of terrain causing incorrect terrain LOD's to be displayed.
2. RN 081113-000021 – When IDX platform release x.17 or later is installed and the GPU is G80 or later, floating point depth buffering will be used when Z++ is selected instead of the current 2 pass algorithm.
3. RN 090109-000001 – Added new test pattern to allow calibration of Gamma correction.

Deficiencies Addressed

1. RN 060511-000001 – Fixed a problem when exiting some utilities (like Detailer) with an exception occurring.

2. RN 071207-000002 – Added call to stats.IncrementReceivedPacketStats() so that igCigiCCL stats dialog will show incoming packets.
3. RN 080806-000002 – *iDataMantisPlugin*: MantisClient would crash when saving .mpf file if the plugin was added then removed before doing the save.
4. RN 080806-000004 – *igActiveStereo*: MantisClient would crash when saving .mpf file if the plugin was added then removed before doing the save.
5. RN 080806-000005 – *TestPatternPlugin*: MantisClient would crash when saving .mpf file if the plugin was added then removed before doing the save.
6. RN 081031-000003 – Reduced channel FOV image size so that it is not larger than the viewing screen in Show Channels.
7. RN 081103-000003 – Fixed issue with SpliceTree causing an exception when exiting.
8. RN 081104-000004 – *VTree*: Fixed crash issue with MnpView when loading a terrain.
9. RN 081110-000004 – Updated Software Licensing Scheme document to address changes in product and subproduct offerings.
10. RN 081113-000004 - Modified Mapped Grayscale test pattern to repeat pattern vertically so that channels whose boresight is pointed up or down don't just see a black screen.
11. RN 090203-000006 – Fixed problem with using QUEST2 and shadows at the same time.
12. RN 090303-000007 – The GetConfig MUT no longer crashes when database file names are long.
13. RN 090417-000000 - Fixed problem with the self illuminating runway number placards down the side of the Socal Pendleton runway not illuminating at night when advanced shaders are active (e.g. when using texel feathering, cloud shadows, shadows, etc.).
14. *Audition*: Fix for shadow tile boundary mismatches.
15. *MantisClient*: Added environment variable "MantisEnableAutoLogging" which when present causes the Auto Logging to be enabled by default.

Advanced Ocean plug-in:

1. RN 090302-000001. Fixed bug with lighting of whitecaps being inconsistent when a spotlight is enabled.
2. RN 090312-000001 – Changed AdvOcean plugin sea state range to 0-8 (was 0-9) as values above 8 are clamped to 8.
3. RN 090415-000002 - Fixed problem with ocean reflections when in geocentric mode. Flickering would occur along the waterline of ships.

RTFoliage plug-in:

1. RN 090324-000000 – Fixed these issues: a) When lots of trees are used in an MNP database performance becomes unacceptably slow. b) Initial paging of trees is extremely slow (just one per frame). c) Whenever a new tree type is paged in a very large glitch occurs.

2.6.3 BID 0ED2 Notes

Deficiencies Addressed

1. RN 090219-000004 – Fixed problem with tracking of which combination of effects have already been compiled when texel feathering is toggled on or off.
2. RN 090312-000002 – Fixed issue introduced in Mantis 2.6.1: when light point glare is enabled the glare was incorrectly using the same texture as the glow.
3. RN 090318-000004 – CgInstall now shows the correct URL to use to obtain an unlock key.
4. RN 090327-000000, 090403-000001 – In order to reduce the amount of CPU memory used by Mantis, textures loaded when processing .vt and .q3dfx files are flagged as being transient so that Mantis does not keep a copy of the image data after downloading them to the GPU.
5. RN 090401-000001 – The segment ID and contacted entity fields of the CIGI IsectorNormalRepsonse packet are now set correctly.
6. RN 090402-000000 – Added code to handle dumping Component Control View Stabilization data.

Advanced Ocean plug-in:

1. RN 090319-000000 – Fixed issue where parts of ocean polygons are visible in the sky when landing at an airfield that is below sea level (e.g. El Centro Airport, 115.671W, 32.830N) with a sea state 3 or greater. The fix implemented is that if *Underwater Mode* is not enabled then the ocean is not rendered at all if the view point altitude drops below the maximum height the of wave crests for the current sea state.
2. RN 090319-000001 – The polygons rendered by this plug-in are now included in the scene polygon count displayed by stats level 3.1 .

CIGI CCL plug-in:

1. RN 090305-000006 – Fixed bug introduced in Mantis 2.6.2 where there would be a LOS failure if the first request was pointed straight down.

2.6.2 BID 0EC6 Notes

Updates/Additions

1. RN 090311-000019 – MantisServer is now linked with the /LARGEADDRESSAWARE option. When used with /3GB in BOOT.INI, this allows MantisServer to use more than 2 GB of memory. This has become necessary when using ViXsen with large databases.
2. RN 090311-000020 – Updated to Cg 2.1 . Gives improved shader performance.
3. RN 090311-000022 – Improved performance when switching between different shader effects by tracking the values assigned to the uniform parameters and only

updating them if they are changed. Scenes with lots of shader switching can be up to 4 ms faster.

View Stabilization plug-in:

1. RN 090225-000002 – Now returns an LOS extended response instead of a basic response for the LOS Test Request packet. Added section on the View Stabilization LOS Test Request packet to the *Mantis CIGI CCL Compliance and Extensions* document.

Deficiencies Addressed

1. RN 090219-000004 – Fixed problem with tracking of which combination of effects have already been compiled when texel feathering is toggled on or off.

Advanced Ocean plug-in:

1. RN 090224-000003 – Fixed scene reflection, which had stopped working in Mantis 2.6.1 .
2. RN 090302-000001 – Fixed bug with lighting of whitecaps being inconsistent when a spotlight is enabled.

Advanced Weather plug-in:

1. RN 081113-000007 – Made cloud shadows fade away when sun/moon gets low in the sky.
2. RN 090225-000003 – If the view frustum asymmetry was such that the complete frustum is outside the LOS then volumetric clouds would have a narrow band at the edge of the screen when the view was inside the cloud layer. Fixed an issue with the way the full screen quad used to do the close up fogging is calculated.

CIGI CCL plug-in:

1. RN 090305-000006 – Corrected problem where the altitude was being zeroed for source and destination causing the LOS to be rejected for updating when the resulting segment length was zero.

2.6.1 BID 0EA2 Notes

Updates/Additions

1. RN 080617-000002 – Added an option to force HATs and HOTs to return the highest altitude result. The General→Graphics tab now has a "HAT/HOT culture check" check box. Checking this forces the "ClosestTerminate" condition for HAT/HOT isectors.
2. RN 081104-000003 – Improved the DXT compression algorithms for MCM and PMM textures.
3. RN 081119-000007 – Added an option to do displacement detail texture feathering. It is enabled by the "Enable texel feathering" check box on the General→Graphics

tab. Texel feathering is enabled by default it. This may impact performance on IDX 3000 and earlier.
4. RN 090112-000009 – Updated copyright year on all executables that have one.

Deficiencies Addressed

1. RN 080421-000002 – Fixed intermittent MantisServer crash
2. RN 080518-000000 – Tile seams can be seen if one of the performance spotlights is muted. This was seen when viewing the SocalSample DB with the Advanced Weather plug-in enabled.
3. RN 080722-000003 – Documented the SceneLoad Response scale in the Mantis User Manual.
4. RN 080729-000001 – Updated environment variable information in the Mantis User Manual.
5. RN 081024-000005 – Fixed a bug in the Z++ logic used to determine if an entity is visible which caused it to give incorrect results under certain circumstances (which can differ from one tile to another). The bug would cause or more of the actually visible entities (including the one the view is attached to) to sometimes be determined to be not visible. When this happened, the following occurred:
   - The second pass alpha rendering would not be done so you would not see any semi-transparent pixels on the entity.
   - The HAT rate for clamping the entity is reduced to around once every 0.5 seconds rather than once every frame as is done for visible entities.
6. RN 081031-000004 – Removed misleading warning message regarding spot lights.
7. RN 081111-000002 – OpenFlight commenting conventions documented in the Mantis User Manual.
8. RN 081119-000006 – Mantis upgrade instructions on Independence added to the Mantis Users Manual.

Advanced Ocean plug-in:
1. RN 060825-000005, 080813-000003 – Fixed problem with shaders re-compiling every frame if Ground Clamped Polygon shadows are enabled and either Cloud Shadows or Layered fog are also enabled.
2. RN 081024-000006 – Cloud shadows fixed on tiled systems.
3. RN 081211-000004 – Fixed wakes and bow spray appearing significantly darker than whitecaps in sensor modes. Fixed problem with whitecap intensity being added to the water intensity and thus making them too bright. Fixed problem with wake and spray effects modulating their intensity by the color intensity specified for the effect in the SCD file. This intensity is primarily intended for OTW. In sensor mode, the intensity should be based off just the temperature
4. RN 090127-000002 – Wake polygons close to the eyepoint were getting culled out or rendered incorrectly. Fixed problem with culling algorithm in vertex shader.

DI-Guy 7 plug-in:

1. RN 090129-000002 – The material applied to DI-Guy characters was just whatever happened to be applied last. Hence sometimes the character would appear dark or semi-transparent.

Real Time Foliage plug-in:

1. RN 081218-000003 – MantisServer would crash under some conditions when trees were being paged in.

2.6.0 BID 0E6B Notes

Updates/Additions

1. RN 080130-000008 – The user can now select which NIC to use when licensing.
2. RN 080731-000004 – Eliminated all static VTree libraries where a DLL version was already being used.
3. RN 080819-000000 – No longer distributing these files previously found in the *docs* subfolder:
   Continuous Model Scaling in Mantis.pdf
   Host Control of Terrain Model.pdf
   Mantis VBO Cache Quick Start.pdf
   Their contents have been incorporated into the Mantis User Manual.
4. RN 080902-000005 – A release stamp of the form *major*.*minor*.*branch*[*qualifier-abbrev*][.*patch*]-*BID* appears in the new file bin_release.txt. All new patches will include an updated version of this file. This will allow the precise release of a particular tree to be determined by simply examining this file. The installation program no longer sets the environment variable MantisVersion and removes it if present.
5. RN 080902-000006 – The installation program no longer prompts to restarts after completing. There are no services associated with Mantis. Therefore, a restart of the computer is unnecessary. Restarting all applications or just logging off and back on is all that's necessary to get the correct environment propagated. README.txt now states this. Also, the *bin* folder is no longer appended to %Path%.
6. RN 080902-000011 – No longer distributing bin\CigiUtils20.exe. Use CigiUtilCCL.exe instead.
7. RN 080908-000003 – No longer distributing bin\CigiUtils.exe. Use CigiUtilCCL.exe instead.
8. RN 081020-000011 – Implemented an improved algorithm for generating city night time texture illumination. The illumination now has more contrast and does not illuminate green areas which results in much more convincing imagery. Note: Users may want to increase the value used for 'Terrain City Glow' on the Advanced Weather tab to compensate for the overall darkening effect of this change.
9. RN 081021-000003 – Delay-load DLLs only used by VTreeDLL when rendering or processing image files. This eliminates having to redistribute several third-party DLLs as part of a couple of software products.

Deficiencies Addressed

1. RN 080802-000002 – Removed the mention of obj2vt.exe from the Mantis User Manual. It had removed from the distribution starting with Mantis 2.4.0.
2. RN 080814-000001 – Fixed problem where isectors would no longer be created for an MFP. Fixed problem where isectors were not being re-used. Corrected isector re-use algorithm to account for isectors rejected due to MFP HAT/HOT/LOS limits. Added code to notify host when MFP requests are rejected. For LOS, corrected check on LOS direction for re-use test.
3. RN 080818-000001 – 1024x1024.pmm is now distributed as part of the Mantis Add-ons ER software product instead of this one.
4. RN 080918-000006 – The MantisServer application errors that occur after many hours running the SoCalSample database are now much more infrequent. The workaround to prevent them completely is to check the "Reset on rewind" setting.
5. RN 080930-000002 – Revived the igCigiV2.igp plug-in. Should you experience problems with igCigiCCL.igp when using CIGI v2.0, this plug-in can be used in its place.
6. RN 081016-000002 – Corrected the image shown in the 'Show Channels' preview window on the Channels→Layout tab. It had been wrong since 2.5.0 RC 5.
7. RN 081022-000001, 081103-000001 – The Start menu item for cgInstall is now removed when uninstalling. Previously, it would be left there if another software product having a cgInstall Start menu item was installed.
8. Fixed problem with duplicate PBuffers being created when there should only be one.
9. Updated the list of environment variables shown on the MantisClient and MantisServer About tabs. They now appear in alphabetical order.
10. Updated README.txt for the removal of all third-party images and databases done in Mantis 2.5.0.

CIGI CCL plug-in:

1. RN 081021-000000 – No longer sending isector responses marked invalid when MFP isector caps are exceeded. The responses are overwhelming the MUT and are not required by the CIGI spec. Also reduced some spammy messages on Client when MFP caps are reached..

RotorWash plug-in:

1. RN 081017-000001 – Changed messages generated on successful loading of the shaders from warning to quiet.

2.5.2 BID 0E56 Notes

Deficiencies Addressed

1. RN 080602-000003 – VTree: Light map textures were sometimes getting applied incorrectly when a spotlight was enabled.
2. RN 080919-000011 – Skymodel.dat: Removed the deprecated (and ineffectual) UseMaterialDiffuseForAmbient setting whose presence now causes warning messages.
3. RN 80923-000004 – VTree: Built in effects including Layered Fog, Cloud Shadows, City Glow, Light Maps, and Shadows have intermittently not worked since Release 2.5.0.

Advanced Ocean plug-in:

1. RN 080917-000009 – Inland water environment reflections no longer jump around a lot for higher sea states in the distance.

Advanced Weather plug-in:

1. RN 080107-000004 – Modified OTW volumetric haze to no longer use the General Visibility setting as its base visibility for the clouds, sky, moon, stars, sun, etc. Instead it now uses the visibility range specified for the top altitude 4 on the plug-in's GUI. This allows the Mantis General Visibility to be used to specify the ViXsen visibility.

2.5.1 BID 0E4A Notes

Deficiencies Addressed

1. RN 070522-000002 – Bookmarks in Mantis manuals now work correctly.
2. RN 070510-000006, 070607-000004, 080603-000003 – VTree: Rotor wash own-ship effects were not occluding light points on other moving entities. This fix does not include NVG lightpoints rendered with halos. In order for this to operate properly, one must enable Near Clip Override in General→Graphics.
3. RN 071214-000002, 080307-000002 – vtDynamicLoader: If an inset region such as an airfield contained VIA (Voxel Intersection Acceleration) data then it was possible for intersections made to the region around the inset region to not intersect the terrain. This fixes the HAT/HOT issues seen in the Southern California Sample database.
4. RN 080815-000005 – The 2.5.0 BID 0E33 Notes section has been updated and the preliminary notice removed.
5. RN 080827-000001 – MantisServer intermittently crashes during initialization.
6. RN 080917-000001 – MantisClient: Legacy roll setting is now saved and restored correctly in the .mpf file.

Advanced Ocean plug-in:

1. RN 080107-000019 – Added some tweaks to make the moon and star reflections in the inland water and ocean appear more visible at night.

CIGI CCL plug-in

1. RN 080630-000009 – Fixed HAT/HOT calculations for UTM terrains. This fix is also available as a patch to 2.4.6 (patch 001).

2.5.0 BID 0E33 Notes

Updates/Additions

1. RN 070918-000001 – The following features/folders are no longer part of the Mantis installation:
   cigi
   configFiles
   data
   helpers
   userPlugins
   utilities
   unitTests
   If a user requires example SCD, MPF and other Database files, SoCalSample database and configuration files may be provided.
2. RN 071207-000003 – OpenFlight plug-in is not used or needed in mantis, should be removed from installation.
3. RN 071211-000006 – Added the View Stabilization plug-in (unlicensed).
4. RN 071212-000007 – The Mantis Channel Layout Tab and CIGI FOV definitions have differed in previous releases of Mantis. This is primarily due to the left vs. right-handedness of coordinate systems in OpenGL vs. CIGI. The Mantis client now supports a Legacy Roll checkbox under the Projector Boresight area in the Channels Layout Tab. This box must be checked to retain compatibility in previous implementations and some display manufacturers. If you would prefer to define your channel layout identical to CIGI, disable Legacy Roll.
5. RN 080107-000004 – The Advanced Weather plug-in now has a Layered Fog feature.
6. RN 080107-000008, 080107-000010 – The Advanced Weather plug-in now has a GUI and CIGI control to specify the degree to which the terrain is illuminated by the same city lights effect used to illuminate the clouds. The installed sample WeatherPattern1.int texture has been modified to have an alpha channel that contains the city lights illumination for the Quantum3D CONUS Database. The plug-in user manual has been updated to specify what values to use to map this texture to the CONUS database. This feature has been added to Mantis in support of users operating in a Stimulated NVG mode, but it may be useful for other applications. For example the pattern above could be blended using Photoshop with a separate image of a silhouette of the US coastline resulting in an Alpha channel that would increase the ambient light around the coastline of the US.

7. RN 080108-000001, 080108-000002 – Added the Custom Symbology plug-in (unlicensed).
8. RN 080111-000005, 080206-000003 – The Mantis installation now contains all of the plug-ins which previously. Since these had separate installations but always were installed whenever Mantis was, these have been rolled into a single installshield. The IData runtime must now be installed separately (just like the DI-Guy runtime is). The hierarchy of features is now:
   Mantis
      Licensed plug-ins
         Advanced Ocean
         Advanced Weather
         DI-Guy 7
         Real Time Foliage
         Rotor Wash
         Shadow
      Documentation (not installed by default)
9. RN 080111-000005 – The Real Time Foliage (SpeedTree) plug-in is now officially one of the plug-ins distributed with Mantis.
10. RN 080111-000005 – The CIGI version 2 plug-in (igCigiV2.igp) and CIGI Version 3 plug-in (igCigiv3.igp) have been removed from the distribution of Mantis. CIGI Version 2.0, 3.0 and 3.2 are now supported by the igCigiCCL plug-in. Support for the extensions documentation on the igCigiV2 and igCigiV3 has also been dropped. Appropriate information may be found in the CIGI Compliance and Extensions document.
11. RN 080111-000005 – The Mantis DIS plug-ins (igDis203.igp and igDis204.igp) are no longer supported and have been removed from the Mantis installation.
12. RN 080111-000005, 080204-000004 – These plug-ins are no longer part of the Mantis installation:
    Aaw.igp
    ChannelColor.igp
    ChannelPip.igp
    igFlockOfBirdsDriver.igp (+.cfg)
    igHud.igp
    igOpenFlight.igp
    igPolhemusFastrakDriver.igp (+.cfg)
    igSound3D.igp
    igStats.igp
    TargetProjectorChannel.igp
    VTreeOverlay.igp
    OceanPlugin.igp (and subsequent documentation).
13. RN 080111-000005 – These files are no longer part of the Mantis installation:
    bin\cv.dll
    bin\GreenBlock.dll
    bin\RoleTypes_sample.config
    bin\sireLabEnables.dat
    bin\vtSound3DDll.dll

bin\plugins\vtOpenFlightTerrexPlugin.dll

14. RN 080111-000005 – Added bin\MnpDump.exe to the Mantis installation.
15. RN 080114-000003, 080114-000005 – The following plug-ins have been renamed:
    OceanPlugin2.igp → AdvOcean.igp
    VolCloudPlugIn.igp → AdvWeather.igp
    SpeedTreePlugIn.igp → RTFoliage.igp
16. RN 080207-000002 – Mantis User Manual now uses book page numbers rather than chapter page numbers.
17. RN 080221-000002 – Many updates have been made to the CIGI Compliance and Extensions document. Sections/Topics affected are the following: Wherever possible CIGI 2 Compatible and CIGI 3 Preferred are used, DOF Control, Switch Control, General Visibility Enable, Advanced Marine Plug-in Control and Sensor Lightpoint Halo controls.
18. RN 080326-000004, 080321-000002 – The CIGI Compliance and Extensions document now reflects support of CIGI v2.0 and CIGI v3.0 in the CCL plug-in. This document already reflected support for CIGI v3.2.
19. RN 080326-000003 – The following two sections now appear in the CIGI Compliance and Extensions document table of contents: Section 18.19 Q3D Extension Sub-Packet: Entity Position and Section 18.20 Q3D Extension Sub-Packet: Clamped Entity Position.
20. RN 080324-000002 – The Real Time Foliage plug-in now supports simulation of localized wind effects based on the position of an entity relative to the tree/grass objects.
21. RN 080402-000000 – The unit tests have been moved into a separate installation. A number of .vt files associated with the unitTests feature are also no longer part of the Mantis installation.
22. RN *multiple incidents* – The Mantis User Manual and Mantis Utilities Manuals have been brought up-to-date. A new Mantis Plug-Ins Manual now contains up-to-date documentation on all of the Mantis plug-ins.
23. The Visual C++ 7.1 library DLLs are now installed in the *bin* folder instead of in %windir%\system32.
24. The installation is now “single-exe” style where setup.exe contains everything needed.
25. These release notes are now named MantisReleaseNotes.pdf.

Deficiencies Addressed

1. RN 070724-000003, 070829-000001, 071114-000000 – Mantis Server crashes during startup and repeated runs have been reported by customers and seen during in-house repeated runs of Mantis. These may occur in OpenGL32b.dll or oglnt.dll. These are possibly due to a driver problem in creating OpenGL contexts. For IDX 4000 systems running IDX Platform x.14, a patch to it is also required.
2. RN 070905-000002 – LOS, HAT, and HOT tests are processed on channel B when mission functions only enabled on channel A. This problem is not seen with mission functions enabled on another channel such as channel B.

3. RN 071015-000006 – If using Host Defined Channel Layout vs. View Control and View Definition, clicking on the Mantis channel tab during runtime no longer resets the channel layout to the values appearing in the MPF. An Apply button has been added.
4. RN 071214-000000 – A problem with channel names has been fixed. In previous versions of Mantis, if channels were named with certain subsets of previously defined channels, an Invalid View Select Mantis Errors Message would occur when CIGI View Definition or View Control was used to alter the channel. Examples of channel names that would result in this problem:
   - Channel name AB gets an error when channels are named in following order: A, B, AB, AD.
   - Channel names 11 and 12 gets an error when channels are named in following order: 1, 2, 11, 12.
   - Channel name 11 gets error an when channels are named in following order: 1, 10, 11, 12.
   - Channel name ChannelA gets an error when channels are named in following order: Channel, A, ChannelA, Chann.

   Examples of channel names not resulting in error are:
   - No channel name error when channels are name in following order: A, B, C, D.
   - No channel name error when channels are name in following order: ChannelA, ChannelB, ChannelC, ChannelD.
5. RN 080321-000002 – The CIGI Compliance and Extensions document sections for Rotor wash Short Component Control fields for Instance ID have been updated from NA to Entity ID to properly reflect that the Instance ID must contain the Entity ID of the Rotor wash Effect.
6. RN 080421-000000 – The CIGI CCL plug-in GUI now correctly displays the wind direction.
7. RN 080701-000001 – On Geocentric terrain with CCL v2.0 connected to a CIGI 2 host, HOT request is returned as HAT and LOS Range is not returned.
8. RN 080703-000003 – Removed mention of AssignCigiViews.exe from the Mantis User Manual. This program is no longer part of the distribution.

Advanced Ocean plug-in:

1. RN 070919-000006 – The Advancd Ocean plug-in documentation has been update to include the most recent GUI and CIGI controls.

Advanced Weather plug-in:

1. RN 070516-000001, 070912-000001 – Cloud shadows are almost imperceptible on terrain. This has been addressed by providing a new General\Graphics2 dialog in MantisClient which allows the user to specify the location of the skymodel.dat file, enable/disable usage of material diffuse for ambient and a scale factor for sunlight ambient.

Cached File Server application and plug-in:

1. RN 080812-000004 – The defaults for the CFS plug-in have been changed. These default settings are compatible with IDX 4000 CSA2:
   - Master = 192.168.1.1
   - Interface = 192.168.1.255
   - Max memory = 200 (MB/s)
   - Network bandwidth = 9000 (KB/s)
2. RN 080821-000003 – CachedFileServer.exe on the IGC no longer consumes 25% of the IGC CPU Load and causes rendering time increases to occur when processing Pre-Swap messages.

Channel Picture In Picture plug-in:

1. RN 070522-000005, 080304-000008 – Added documentation for Channel PIP Plug-in Mantis Plug-ins Manual.
2. RN 071004-000000 – PIP window will not turn on and off from a host

CIGI CCL plug-in:

1. RN 080429-000004 – The Visible Band Haze Color control works with Component Data set to float instead of uint32 with the CCL plug-in.
2. RN 080429-000003 – The General Visibility Color control does not update the color using the Cigi3 or CCL plug-in.
3. RN 080207-000001 – Missing documentation for CIGI VSync Tab now included in Mantis User Guide.
4. RN 080207-000003 – Missing documentation on CIGI General Tab now included in Mantis User Guide, this includes Strict Data Processing, Asynchronous, Async Extrapolation.
5. RN 080429-000001 – MantisClient displays warning messages for other glow intensities after sending a glow intensity control with Cigi3 and CCL plug-in. For Example if a control is sent for the moon glow intensity, warning messages are displayed for the following:
   W: 209.6170 (0e70): Invalid sun glow intensity value(), setting to 100.0
   W: 209.6170 (0e70): Invalid city glow intensity value(), setting to 100.0
   W: 209.6170 (0e70): Invalid horizon glow intensity value(), setting to 100.0
6. RN 080425-000002 – DOF, Switch, and General Visibility Enable controls are now implemented in the CIGI CCL plug-in. The Component IDs changed from implementation when using the igCigiV2 plug-in. Changes effect the component IDs used for the DOF and switch packets from what was being used for the CIGI 2 plug-in as those values had already been used for something else in the CIGI 3 plug-in. This is the way they map:
   DOF Control – X and Y Position - Cigi2: 320; CIGI CCL: 329
   DOF Control – Z Position and Rotation About Y- Cigi2: 321; CIGI CCL: 330
   DOF Control – Rotation About Z and X- Cigi2: 322; CIGI CCL: 331
   Switch Control – Cigi2: 323; CIGI CCL: 332

Color Tuner plug-in:

1. RN 070522-000004 – Added documentation for ColorTuner Plug-in Mantis Plug-ins Manual.

IGM plug-in:

1. RN 060418-000004 –The IGM plug-in now can properly enable/disable video for Axx channels.

Real Time Foliage plug-in:

1. RN 070514-000006 – A difference in shading between LODs of trees in the Real-time Foliage plug-in has been corrected. In addition, when modeling the trees, the CompositeLeafMap texture should be generated with the 'Uniform Lighting' box unchecked. If it was checked then this will result in darker billboards used on the low LODs.
2. RN 070719-000000 – Real-time Foliage plug-in billboard tree LODs have white fringe. This CompositeLeafMap also addresses a white fringe around trees. This issue is caused because the CompositeLeafMap generated by SpeedTreeCAD for this database has a white background around each tree. So when you drop down mipmap levels the white bleeds into the rendered part of the tree. SpeedTreeCAD provides the option to streak the color from the billboard onto the background for a settable number of pixels. The default amount is 25 pixels which still leaves a significant sized white border. This value should be set to at least half the size of the billboard texture so that the streaks extend to the edge of the texture. By streaking the color outwards from the image any bleed in of background color can be elliminated.
3. RN 080114-000003 – The filename of this plug-in has been changed from SpeedTreePlugIn.igp to RTFoliage.igp.
4. RN 080114-000004, 080115-000004 – The Real Time Foliage plug-in is now documented in the Mantis Plug-ins Manual. This includes documentation on the plug-in and database development.
5. RN 080324-000002 – Enhancements to Real Time Foliage plug-in including support for localized wind effects.
6. RN 080416-000002 – The Real Time Foliage Plug-in now operates with Advanced Weather effects (lightning, shadows, layered fog).
7. RN 080702-000006 – If both the Wind Ambient and Positional sliders in the Real Time Foliage Tab are at 0, they can now be modified after start up. Previously, they were grayed out.

Real-time Shadow plug-in:

1. RN 080226-000004 – Shadow receiver geometry disappears when third spot light is enabled.

Target Projector Channel plug-in:

1. RN 070522-000006, 080304-000007 – Added documentation for Target Projector Channel plug-in to Mantis Plug-ins Manual.

Viewport Effect plug-in:

1. RN 070522-000007, 080319-000006 – Added documentation for ColorTuner plug-in to Mantis Plug-ins Manual.

2.4.6 BID 0DFE Notes

Updates/Additions

1. RN 080328-000003 – Added 1024x1024.dds and 1024x1024.pmm to *cache* folder.
2. Mission function optimizations:
   a. Isectors only created on MFP channels
   b. User can specify number of HAT/HOT/LOS isectors on Channels/Layout GUI
   c. Updated isector allocation algorithm
3. Celerity is no longer distributed as part of Mantis.
4. The unused file bin\NTClassify2003DLL.dll is no longer installed by Mantis.

Deficiencies Addressed

1. RN 070524-000001 – Fixed LOS and HAT values differing by 1m.
2. RN 071207-000001 – Removed references from the Mantis User Manual to loading OpenFlight directly in Mantis.
3. RN 080111-000004 – Removed DIS plug-in information from the Mantis User Manual. Added information on Interim Channel Renderer.
4. RN 080117-000002 – Updated Mantis User Manual for MantisClient GUI HAT/HOT and LOS change from check box to value.
5. RN 080123-000000 – Fixed Acrobat error in the Mantis User Manual when clicking on an item in the Table of Contents.
6. RN 080206-000002 – The Mantis installation ReadMe has been updated.
7. RN 080317-000000 – The CigiCCL plug-in now handles the CIGI 3.2 host echo of the SOF frame number. Also increased receive message buffer size from 32KB to 1MB and modified processing of received data to better handle large packets.
8. RN 080408-000000, 080420-000000 – Fix for problem with rain/snow being rendered incorrectly when Advanced Ocean plug-in reflections are enabled or when shadow map shadows are enabled.
9. RN 080410-000000 – Updated the copyright year to 2008 in Audition.exe, OpenFlight2VTree.exe, MantisClient.exe, MantisServer.exe, MnpView.exe, and SpliceTree.exe .
10. RN 080416-000001, 080417-000001 – Fixed a bug where when wind direction for either atmosphere or layered weather was updated via Cigi the direction angle was incorrectly being converted from radians to degrees before being sent to MantisServer. The value is already in degrees so no conversion is required. The direction was not being converted for the GUI update so things looked OK on the GUI.
11. A number of extraneous files under the *unitTests\bin* tree are no longer installed by Mantis.

Advanced Ocean plug-in:

1. RN 070808-000001, 080226-000007 – When either channel is flipped either horizontally or vertically the far ocean would render incorrectly due to some back face culling issues.
2. Fixed to allow shoreline texture to span 90deg West line of longitude. This allows a single shoreline map for the entire US to be used. This change means you now can not span the 180deg longitude with a shoreline texture.

IData plug-in:

1. RN 080221-000001 – Fixed a bug where Mantis plug-in would crash sometimes when 'Use Quest Shader' was selected.
2. RN 080425-000004 – The version field shown on the Support Info dialog under Add or Remove Programs now includes the BID.

SpeedTree plug-in:

1. RN 070611-000000 – Fixed first time render glitches.
2. RN 080306-000001 – Fixed the crash on database change.

2.4.5 BID 0DB5 Notes

Updates/Additions

1. Added C:\mantis\bin\skymodel.dat. It contains a UseMaterialDiffuseForAmbient directive, which is a workaround to make shadows be darker. Without this, shadows are often difficult to see.
2. RN 071120-000000, 071128-000002 – Updated the Detailer SegmentTab image in the Mantis User Manual and added documentation for Pick Mask and Enable Stretching.
3. RN 071128-000001 - Updated CIGI 3.*x* extensions documentation for the volumetric clouds controls.

Deficiencies Addressed

1. RN 071120-000003 – Missile trails were only using the ambient light component for illumination so they came out dark when the ambient light level was reduced in order to get shadows working. Modified illumination calculations to use diffuse light component but in a non-directional way.
2. RN 071129-000002 – Fixed Collision Segment Notification Responses being incorrectly reported.
3. RN 071212-000007 – Fixed a bug where rolled asymmetric views have the incorrect viewing frustum applied at run-time. This was a GUI related problem; CIGI worked fine.
4. RN 080117-000001 – Fixed a couple of bugs that stopped morphing bidirectional and morphing unidirectional light points from being rendered.
5. RN 810114-000001 – Modified Mantis User Manual and Mantis Utilities Manual to reflect version 2.4 instead of 2.3.

6. Fixed a bug during database switching where the new terrain was removed as well as the old terrain.

Mantis Native Paging plug-in:
1. RN 070918-000005 – Throttled NULL pointer warning messages to be issued only once per second.

Rotor Wash plug-in:
1. RN 071120-000003 – The rotor wash particles were coming out dark when the ambient light intensity was reduced in order to make shadows work. []

Volumetric Clouds plug-in:
1. RN 070607-000006 – On IDX 4000, occasionally the volumetric clouds would not appear at startup.
2. RN 080103-000004 – Fixed a bug that caused banding and a dark fringe around each slice of the Hi-LOD clouds.
3. A single slice can now be created so it ends up looking like 2D clouds. This gives performance comparable to regular 2D clouds but also provides the capability to cast shadows

2.4.4 BID 0D5E Notes

Updates/Additions

1. Added call to q3dNvsResetVideoAlways() when hardware sync is enabled, this forces a video reset similar to IGM Manager 'Reset 3D Graphics' and should guarantee the video is in sync.
2. Updated the NFOV processing to use 3 vectors instead of just 1 for improved paging center selection.
3. Advanced lightpoint updates:
   a. Made Advanced Light Points respond to point min size and 'Light Point Arc Length Minimum' values.
   b. Softened edges of Advanced Light Points slightly to reduce aliasing issues when points bunch up.
   c. Clamped light color to the incoming light color so that CIGI control of light group intensities affects the final rendered intensity (although when used this really defeats the high dynamic range calculations that are being performed).
4. Added GUI utility CigiUtilsCCL for dumping CIGI logs, handles v2.0, v3.0 and v3.2 files.
5. Changes to improve terrain paging performance.

Deficiencies Addressed

1. Crash fix on Quadro 4600 & 5600 – fixed un-initialized index stream array.

2. Fixed a render bug with the stars when the magnitude was changed, the stars seemed to disappear if the near clip was greater than 1.6 or so, problem was the bounding information was not being correctly set after the magnitude change.
3. Fixed bug in logic used to construct spot light matrix which would in some circumstances result in an invalid matrix.
4. Disable two pass alpha rendering during the first shadow pass to improve performance.
5. ManterServer About box, fixed typo: 'disableLowFraqHelp' should have been 'disableLowFragHelp'.
6. Additional fixes related to grid caches and switching databases.
7. Fixed a narrow FOV bug that prevented the terrain from paging unless the center of the frustum intersected the terrain.
8. Fixed sync methods for paging center offset parameters to correctly return success or failure, this was causing a startup initialization problem for NFOV processing.
9. Fixed a crash that occurred while rendering queued up lightpoints on non-rendering channels in Mantis.

igCigiV2/igCigiV3/igCigiCCL:

1. Fixed a math error for HAT/HOT returns which always reported positive values, this was incorrect if the terrain or ocean geometry was below sea level, for these cases the returns should have been negative.
2. Fixed a bug when unloading attached models, the wrong function was being called. This resulted in empty orphan models attached to the original parent model on the server.
3. Added more information to warning message when a part or script id is invalid for a model.

igCigiCCL:

1. Added support for SOF message fields: 'Timestamp' and 'Last Host Frame Number'.

SpliceTree:

1. Fixed texture selection controls on geometry node parameters page 2.

Advanced Ocean plug-in:

1. Fixed problem with shoreline only working within origin longitude offsets in the range -90 to -179.9999.
2. Updated code so that LOS isectors worked properly against the ocean.
3. Modified the intersection test so that the ray was compared against the actual ocean geometry height rather then sea level, this allows for proper intersection testing against an undulating sea.
4. Fixed a problem that resulted in divide by zero that generated Qnan and slow rendering, the view frustum position was being used before it was set.
5. Fixed typo, wave blur was being used to set quality instead of wave blur.
6. Simple fix to prevent division by numbers less then 1.0, a crash was happening if the shoreline scaling (latitude or longitude) was set to 0.0.

7. Added support for environment variable: MANTIS_OCEAN_ENABLE_OVERRIDE to allow the user to force a disable (or enable) of the advanced ocean plug-in on selected servers independent of GUI setting.

ChannelPIP plug-in:
1. Fixed a GUI bug which showed the MasterEnable set to true even if it was false in the .mpf file.
2. Fixed the Apply button to be disabled after loading the .mpf file.

IData plug-in:
1. Fixed a crash problem if the .idz file was not found.

Shadow plug-in:
1. Added shadow map resolution CIGI component control.

SpeedTree plug-in:
1. Added check for external ref aux pointer, which could be NULL for non-morph databases.
2. Fixed SpeedTree tab being removed when other plug-ins are removed.
3. Changed default "Use Tree Builder File" setting to be FALSE.
4. Fixed Enable button not causing the Apply button to become active.

Test Pattern plug-in:
1. Added CIGI handlers and image test pattern support.

Viewport Effect plug-in:

1. CIGI control wasn't working, channel name comparison was wrong.
2. Assigned effect did not activate at startup without explicitly re-assigning the effect.
3. Changed the GUI tabname to be unique, it was the same as the TargetProjectorChannel plug-in and caused problems when adding and removing this plug-in in regards to the TargetProjectChannel plug-in, the wrong plug-in was being removed.

2.4.3 BID 0D0A Notes

Updates/Additions

1. LOS isectors now intersect backfaces of polygons, excluding the terrain skin. In order to properly intersect the terrain skin, LOS isectors must be defined in the correct direction (from tail to head).
2. Updated particle effects to utilize Orient with Model, permitting particle velocities to use the parent orientation. (Particles will emit in a direction relative to the entity instead of ENU with Orient with Model.)
3. Added support for unique TPF (paging ranges) per swap domain.

4. Updated the Sync to VSYNC serial line support for improved operation on QuickSilver.
5. Updated the database load processing to improve reliability when switching databases, this includes the CFS interface.
6. Added support for fade-to-black changes. Sky can fade-to-black over some altitude range defined in the skymodel.dat file. Also, the haze band can be faded to an alternate color over some altitude range also defined in the skymodel.dat file.
7. No longer including the Standard Ocean plug-in what is built and distributed.

Deficiencies Addressed

1. Fixed performance/thread-safe access problem for paging terrains and advanced ocean plug-in. Traverse() method was being called even though the entity handled the intersection processing. For paging databases this resulted in an un-safe thread access since the scene graph could change during Traverse() processing. In the cases where the entity handled the intersection processing this also resulted in a second scene graph traversal which is a performance issue.
2. CIGI30: Corrected the size of the Isector Normal Response packet to be 6 words.
3. Fixed a potential crash due to missing parameters in the light point shaders.
4. Fixed a problem with thunderstorm rain cylinder failing to extend to the terrain until a position update was received
5. Fixed a volume ID reporting bug for the igCigiCCL plug-in.
6. Fixed bug for screen blanking where color data was incorrectly retrieved as float data for Cigi3.x.
7. RN 070621-000003: Fixed fog light selection algorithm to ensure lights are turned on at low illumination levels, avoiding popping as models entered the user specified light radius (where 10% illumination is defined).
8. Fixed bug with cloud deck coloring when removing clouds, the cloud deck color was not being updated as it is when a cloud is added.
9. Fixed a paging problem with some paging terrains, low-level tiles could be switched out and result in holes in the database.
10. Added code to invalidate isector grid caches when the terrain is sync'd.
11. Made some code changes to prevent the paging thread from being re-started on every database change.
12. Added result code check for the Traverse() method to fix a bug where scene graph traversal continued after a collision was found and under some circumstances, the last bounding volume tested was reported as the collision volume when in fact, a previously tested volume was the actual collision volume.
13. RN 070402-000004 - Fixed problem when ESync is disabled, the modulo value was invalid but still used to set the frame period in the render context, which in turn hosed up the skipped animation code for fx's.
14. Couple of fixes so that the cloud geometry better matches the curvature of the earth for large far clip distances.

VTree:

1. Fixed a startup problem with Advanced Ocean on tiled IDX systems, the shader projection matrix could be initialized with invalid projection information.
2. Fixed a crash, mainly on MFPs, when selecting morphing terrain or culture. The viewport pointer may not be valid
3. Fixed a problem with alpha components of fx's like missile trail when in single pass mode.
4. Added a subdownload to every new VBO to prevent later glitches on NV40.
5. VBO memory leak fix, checked return from VBO cache manager Free() and if it failed then explicitly deleted the VBO.
6. Fixed a crash on stop/exit problem running the latest InnsBruck demo.
7. Increased minimum pixel size from 1.0 to 1.375 pixels when Advanced Light Point Processing is enabled. This is to address issues with scintillation that were occurring.
8. Fixed problem with popping on fade LOD's.
9. Fixed a problem that sometimes occurred with morphing terrains whereby the morphing terrain shader would get left bound after rendering the terrain and would hose up the rendering of other things such as stats.
10. Fixed a memory leak in vtDynamicLoader due to unfreed geometry nodes, the switch, dof and animation node tables were not being cleared when the archive was cleared prior to switching to another database.
11. Forced all terrain textures on texture unit 0 that did not already have clamping properties to clamp-to-edge.

Detailer:

1. RN 070620-000002: The SLM tab does not retain the model's render priority state. Changed GUI enables to use the model's state when setting GUI controls.

CelerityGUI:

1. Updated version to 1.6.1.

Advanced Ocean plug-in:

1. Fixed problem with environment map intensity of 0.0 not making environment map completely disappear for sea states 0, 1 and 2.
2. Made changes to reduce lighting discontinuities on wakes during day/night transition.
3. Fixed compile errors when using ViXsen on ATI GPU's.

Mantis Native Paging plug-in:

1. Added code to check to make sure that the vtEntity for the paging terrain is added to the scene to prevent the missing terrain problem.
2. Forced some of the Ready() processing to occur only in the render thread to prevent a random thread deadlock.

DiGuy6/7 plug-ins:

1. Fixed a crash bug with DiGuy7 plug-in, apparently the diguy_scenario::destroy_character() method crashes if you pass in a NULL character pointer, this was not a problem with DiGuy6 SDK.
2. Fixed a luminous polygon rendering bug by changing the SetColor() method used from vtColor based to integer based. This results in a call to glColor() which sets up the render state properly. What doesn't make sense is that the OpenGL color was already white, so the call shouldn't be necessary.

Rotor Wash plug-in:
1. Improved reliability on tiled systems by removing synchronous event timing assumptions and quantizing time. Rotorwash is now largely event asynchronous as far as shell creation times are concerned.
2. Implemented alternate timing to reduce first time render spikes.

SpeedTree plug-in:
1. Increased positional wind sent to grass shader tenfold.

V*olumetric Clouds plug-in:*
1. RN 061025-000000: Lightning was getting rendered incorrectly if it was enabled but the vol clouds were not enabled when in geocentric mode.
2. RN 070524-000000:
    a. Fixed problem with clouds being rendered incorrectly if more than 1 entity was inside the cloud layer.
    b. Fixed problem with Low LOD clouds being rendered incorrectly when in geocentric mode and any entities are inside the cloud layer.
    c. Fixed problem with state getting corrupted when bicubic filtering is enabled. This was leading to incorrect rendering of things like stats, or the paging textures being rendered on the screen as they are loaded on certain GPU/driver combinations.

2.4.2 BID 0CF3 Notes

Updates/Additions

1. Added a command line option "enableTiledWindowAdjust" to MantisServer to enable tiled window adjustment operation, and removed the environment variable that used to control it.
2. Updated advanced light point processing GUI controls in MantisClient.
3. Switched to new light point glow method that does not use 3D textures and is thus compatible with ATI GPU's. New method is also more versatile providing independant control of glow and glare.
4. Modified regular light points (i.e. without 'advanced light point processing' enabled) to use point sprites instead of the old GL_POINT_SMOOTH method. The new method uses a fragment shader to render an anti-aliased circle in the point sprite. The resulting light points are much more stable than the old ones and no longer exhibit the horrible aliasing and scintilation that we used to get. This change

also lets the lights run on ATI GPU's without sending the frame rate to less than 1Hz.
5. Got shadows working using Frame Buffer Objects rather than PBuffers.
6. Got shadows working on ATI GPU's

Deficiencies Addressed

1. Fix for "All packet frames full" error from constantly resending a 0-byte message which cause Mantis to slow to a crawl with a message stuck in the reliable UDP write buffer that could never be sent.
2. Made changes to the GetEntityRotation() call for model scripts to support EUS rotations. Needed, for example, for IFLOLS stabilization.
3. Fixed problem with smooth shadows only working correctly when shadow map size was 2048x2048 - now works with any size.
4. Fixed a bug in fx update processing for overframe conditions, depending on the number of render passes the missing fx updates might not be applied to all fx's.

CelerityGUI:
1. Added reprocessing and tpf read properties.
2. Added additional options for:
   a. Read existing tpf file
   b. Inhibit Optimizations
   c. Generate Single LOD of Terrrain
   d. Read Pre-morphed source data - for Presto.
3. Detected SpeedGrass and Powerline cases, so that they get properly treated and moved to cuture sibling branch.
4. Fixed Speedgrass detection other than 15.
5. Added logic in merge to limit sizes created.

Advanced Ocean plug-in:
1. Added underwater mode check box. This currently just disables back face culling when rendering the ocean so the ocean surface is fisible when the view is underwater. You can use the FogColor commands in SkyModel.dat to change the fog color to a bluish water color when the fog is wound in to get the full underwater effect.
2. Added height scale GUI control.
3. Added option for discolored water effect instead of shoreline effect.
4. Added WaveBlur control to allow user to reduce aliasing artefacts on the distant ocean.
5. Fixed problem with mismatch between cloud shadows on ocean and terrain. There is still a slight error but it's a lot better than it was. Also currently latitude of interest needs to be set to 0 for the cloud shadows to appear in the correct place.
6. Fixed problem with wavelengths for sea state 3 being too long.
7. Made the spray brightness be independent of view direction.

GroundFog plug-in:

1. Changed the licensing code to use subproduct 13.

DiGuy6 plug-in:

1. Various updates to eliminate sync problems on a tiled channel or between channels:
   a. Added queues for actions and appearances to apply commands at the same time on all IGRs.
   b. Eliminated most force_action() calls which can cause sync problems.
   c. Added client side capability to force action on overframes, but this is currently disabled.
2. Changed action to be occur in non-immediate mode.
3. Fixed a warning in Detailer when creating character, the name of the fx was not a valid DiGuy character definition.
4. Changed code so that DiGuy's are created in the SyncCreate() method instead of being created in the Update() or Render() method, helps with IDX sync issues.
5. Fixed crash on sensor channels if the new texture indices were changed to match old index.
6. Couple of tweaks so that characters can be paused/restarted without impacting appearance or action changes and changing appearances preserves the current action.

SpeedTree plug-in:

1. Changed GUI to modulate grass color in R/T with top and bottom color.
2. Queued loading of trees to reduce flashing at init.
3. Change in wind strength for grass and instanced trees based on viewpoint position. Disable by setting positional wind speed to zero.
4. Additional grass render state control
5. Added fixes so ViXsen is better supported for trees but not yet grass. In fact grass is disabled with ViXsen. Branches, fronds, and leaves should render adequately with ViXsen. NTDDS not yet supported due to lack of proper callback mechanisms.
6. Changed branch texture to use VTree instead of OGL. This cleaned up a flashing caused by incorrect shader binding for tree branches. Added locks when loading texture to prevent possible crash while ViXsen is accessing texture list and updating.
7. Use mipmaps for grass to avoid aliasing.
8. Added licensing code using subproduct 14.
9. Only disable wind on GUI if both ambient and positional wind are zero.
10. Fixed problem where SpeedTrees would flash in ViXsen during paging. Polygonal alpha was not getting set because glBlend was disabled, but the ViXsen shader tracks VTree not OpenGL with respect to blending.

Volumetric Clouds plug-in:

1. Added support for Short Component Control for CIGI 3 and CIGI CCL.
2. Fixed a crash bug caused by setting the thickness to 0.0, added range check so the thickness is never less than 0.1 m.

2.4.1 BID 0CDA Notes

Updates/Additions

1. Changed the algorithm for deciding VBO cache bin sizes to use powers of two starting at 512 bytes. This new algorithm forces a one-to-one relationship between the incoming VBO size request and the cache bin size used to satisfy the request. Added an error reporting mechanism that reports VBO cache errors all the way back to the client and included a warning regarding old cache definitions that have bin sizes incompatiblle with the new algorithm. Altered other VBO cache errors to use the new error reporting mechanism.
2. Performance improvements based on VTune results:
    a. Avoid leaving entities that were culled in the first pass in the sorted list for two pass rendering
    b. Inline some methods
    c. Avoid doing halo work when not necessary
    d. Avoid doing 'rendered placement' work when not necessary
    e. Provide quicker access to 'scene parent 0' and 'channel parent 0' in igHostModel and igHostScene respectively.

Deficiencies Addressed

1. Modified the near clip override processing so that haloes on sensor channels are not rendered on top of ownship geometry. Using the depth clamp extension.
2. Fixed bug that kept igHostWindow::SyncSize() token dirty for full screen windows.
3. Added range check prior to calling asin(), if the input is out of range asin() will return NAN, this results in all kinds of problems, including sky model lighting problems.
4. Added lock for processed image to try to prevent crash if the texture is being incrementally downloaded while ViXsen tries to update the processed image data.
5. Fixed random crash which occurred during database switch on channels marked for mission function processing.
6. Fix for a rare crash while force rendering light point shaders the first time. In cases where this would have happened, it simply will not force render them.
7. Fix for bugs with rain and clouds not rendering black as they should on target projector channel plug-in target channels.

Advanced Ocean plug-in:
1. Fixed problem with bowspray and wakes when shadows are enabled.

AAW plug-in:
1. Tweaked default simulation parameters.
2. Added code to prevent the wire from going under the ship's deck. Has only been tested with one ship (CV68).

ChannelPIP plug-in:

1. Added save/restore information to the channel info classes.
2. Fixed bug that caused the lightpoint intensities of the entity rendered in the PIP window to not match that of it's counterpart in the main scene.

DiGuy6/DiGuy7 plug-ins:

1. RN 070419-000002 - Fixed problem with DiGuy characters getting out of sync on sensor channels. I don't think the problem is necessarily related to sensor channels, but any prolonged render delay.
2. Fix for incorrect shader bindings in ViXsen when rendering DI-GUY, which manifested itself as black/incorrectly rendered DI-Guy in certain view angles with certain scene elements present

2.4.0 BID 0CC7 Notes

Updates/Additions

1. Added new CCL based CIGI plug-in: igCigiCCL.

Deficiencies Addressed

1. RN 070403-000002 - Fixed state problems caused by the IData plug-in in conjunction with ViXsen.

2.3.16 BID 0DE8 Notes

Updates/Additions

1. RN 071212-000002, 080115-000005, 080201-000001 - Added Large Entity Count support, specifically:
    a. Added two new Q3D extension packets (Entity Position - 1 and Clamped Entity Position - 1) that are basically lighter versions of an Entity Control packet.
    b. Added a mode to igModel* to favor speedy transfers over accuracy. Models are only placed in this mode if updated with the aforementioned packets. They are placed back in normal (favor accuracy) mode when updated with 'standard' CIGI entity controls.
    c. When in favor speed mode, modified pack/unpack of data transferred between Client and Servers to transfer XYZ position as 5-byte values. Again, only when models are updated using the lighter packets.
    d. Reduced overhead of sending entity placement data between Client and Servers by creating fewer large messages rather than many small messages. Overhead per small message was ~50%.
2. RN 080117-000005 - DiGuy7Plugin is no longer distributed as part of Mantis v2.3.x.
3. Celerity is no longer distributed as part of Mantis.

Deficiencies Addressed

1. RN 080117-000000 - Updated the copyright year to 2008 in Audition.exe, MantisClient.exe, MantisServer.exe, MnpView.exe, and SpliceTree.exe .
2. RN 080117-000002 - Updated Mantis User Manual for MantisClient GUI HAT/HOT and LOS change from check box to value.
3. RN 080123-000000 - Fixed Acrobat error in Mantis User Manual when clicking on an item in the Table of Contents.
4. RN 080206-000002 – The Mantis installation ReadMe has been updated.
5. RN 080317-000000 – The CigiCCL plug-in now handles the CIGI 3.2 host echo of the SOF frame number. Also increased receive message buffer size from 32KB to 1MB and modified processing of received data to better handle large packets.
6. Fixed bug in the handling of the MANTIS_RUDP_MAX_PACKET_SIZE environment variable.
7. A number of extraneous files in the *unitTests\bin* folder are no longer installed by Mantis.
8. The *helpers* folder has been removed from the Mantis SDK.

2.3.15 BID 0DB4 Notes

Deficiencies Addressed

1. RN 071212-000007 - Fixed a bug where rolled asymmetric views have the incorrect viewing frustum applied at run-time. This was a GUI related problem; CIGI worked fine.
2. RN 071129-000002 - Fixed Collision Segment Notification Responses being incorrectly reported.
3. RN 080115-000001 - The correct CIGI 3.*x* manual (3.2) now appears in the Mantis start menu.
4. RN 080118-000002, 080118-000003 - Fixed issue with stars sometimes disappearing if the Star Field Minimum Magnitude field is changed after startup.

Volumetric Clouds plug-in:
1. RN 071211-000000 - Volumetric Clouds CIGI CCL packets now have an effect.
2. RN 080103-000004 - Fixed a bug that caused banding and a dark fringe around each slice of the Hi-LOD clouds.

Standard Ocean plug-in:
1. RN 071211-000004 - Marine CIGI CCL packets now have an effect.

Advanced Ocean plug-in:
1. RN 080117-000003 - Fixed issue with LOS and HAT tests failing to intersect with ocean surface.

2.3.14 BID 0D98 Notes

Updates/Additions

1. Added new CCL based CIGI plug-in: igCigiCCL.
2. Added documentation related to CIGI 3.2.
3. Optimized Mantis Client/Server processing of entity placements. Added a bit-mask to the entity placement message so that only components of the placement message that have changed need to be synchronized.

Deficiencies Addressed

1. Fixed a bug during database switching where the new terrain was removed as well as the old terrain.
2. RN 071128-000001 - Updated CIGI 3.x extensions documentation for the volumetric clouds controls.
3. RN 071128-000002 - Updated the Detailer SegmentTab image in the Mantis User Manual and added documentation for Pick Mask and Enable Stretching.

4. RN 060412-000007 - Fixed issue related to halos being clipped at the far clip plane.

Advanced Ocean plug-in:
1. Fixed a problem that resulted in a divide by zero which was causing slow rendering. Added a check on position and for geocentric mode to make sure they are reasonable.
2. RN 070919-000010 - Fixed a crash that was happening if the shoreline scaling (latitude or longitude) was set to 0.0 by preventing division by numbers less then 1.0.

Mantis Nativ ePaging plug-in:
1. RN 070918-000005 - Throttled NULL pointer warning messages to be issued only once per second.

2.3.13 BID 0D14 Notes

Updates/Additions

1. Added call to q3dNvsResetVideoAlways() when hardware sync is enabled, this forces a video reset similar to IGM Manager 'Reset 3D Graphics' and should guarantee the video is in sync.
2. Added pixel format selection to the InterrimChannelRender plug-in.
3. Updated the NFOV processing to use 3 vectors instead of just 1 for improved paging center selection.

Deficiencies Addressed

1. Fixed a narrow FOV bug that prevented the terrain from paging unless the center of the frustum intersected the terrain.
2. Fixed startup problem which prevented reliable setup for paging center offset parameters, some channels were correct while others were not.
3. RN061222-000002 - Fixed bug where entities were not correctly culled in flipped and tiled asymmetric viewports which could result in missing polygons in the models or terrain.
4. Crash fix for switching databases with active shadows.

igCigiV2/igCigiV3:
1. Added moon elevation and phase query.
2. Fixed an error for HAT/HOT returns which always reported positive values, this was incorrect if the terrain or ocean geometry was below sea level, for these cases the returns should have been negative.
3. Fixed a bug when unloading attached models which resulted in empty orphan models attached to the original parent model on the server.
4. Added more information to warning message when a part or script id is invalid for a model.

2.3.12 BID 0D09 Notes

Updates/Additions

1. Various stability fixes related to CFS and database switching:
    a. Added code to check to make sure that the entity for the paging terrain is added to the scene to prevent the missing terrain problem.
    b. Forced some of the ready processing to occur only in the render thread to prevent a random thread deadlock.
    c. Fixed a memory leak due to unfreed geometry nodes, the switch, dof and animation node tables were not being cleared when the archive was cleared prior to switching to another database.
    d. Fixed a thread bowtie issue that happened occasionally during a database switch.
2. Updates to the terrain paging algorithm for improved processing:
    a. Consolidated code that pushes out switch in-ranges based on enforcing 1 LOD difference between neighboring tiles.
    b. Enforced correct ranges at every level in the code, fixing the potential for incorrect paging because of inverted switch-in ranges. This would appear as low resolution tiles being switched on even though higher resolution tiles should have replaced them.

Deficiencies Addressed

1. RN 070402-000004 - Fixed problem when ESync is disabled that could trigger the skipped fx animation code and result in apparent stalled rendering.
2. Fixed a problem during collision processing that could sometimes return the wrong collision volume results.
3. VBO memory leak fix.
4. Fixed a crash on stop/exit problem running the latest InnsBruck demo, the render context pointer was invalid during VBO cleanup.

2.3.11 BID 0CFF Notes

Updates/Additions

1. Various stability fixes related to CFS and database switching.
2. Added a subdownload to every new VBO to prevent later glitches on NV40.
3. Updated particle effects to utilize Orient with Model, permitting particle velocities to use the parent orientation. (Particles will emit in a direction relative to the entity instead of ENU with Orient with Model.).
4. Added support for unique TPF (paging ranges) per swap domain. Note that .tpf file format has changed and will not work in prior Mantis versions.

Deficiencies Addressed

1. Fixed bug with cloud deck coloring when removing clouds, the cloud deck color was not being updated as it is when a cloud is added.
2. Fixed problem with fx's such as the missile trail when rendered in one-pass alpha mode.

2.3.10 BID 0CE2 Notes

Deficiencies Addressed

1. Fixed crash which occurred randomly during a database switch on channels marked for mission function processing.
2. Fix for "All packet frames full" error from constantly resending a 0-byte message which cause Mantis to slow to a crawl with a message stuck in the reliable UDP write buffer that could never be sent.

2.3.9 BID 0CD9 Notes

Updates/Additions

1. Changed the algorithm for deciding VBO cache bin sizes to use powers of two starting at 512 bytes. This new algorithm forces a one-to-one relationship between the incoming VBO size request and the cache bin size used to satisfy the request. This change will require the user to re-create all of their exising .CCH files.
2. Added an error reporting mechanism that reports VBO cache errors all the way back to the client and included a warning regarding old cache definitions that have bin sizes incompatiblle with the new algorithm.
3. Performance improvements based on VTune results
4. Updated to CG v1.5.1. Note: the DLLs indicate 1.5.0.19, not 1.5.1. This reduces memory usage on sensor channels due to excessive use of memory for compiled shader programs.

Deficiencies Addressed

1. Moved creation of the vtDynLoadEntity object from the constructors to the SyncFile() method in the MNP plug-in. This fixes a random crash.
2. Added range check prior to calling asin(), if the input is out of range asin() will return NAN, this results in all kinds of problems, including sky model lighting problems.
3. Added lock for processed image to try to prevent crash if the texture is being incrementally downloaded while ViXsen tries to update the processed image data.
4. Modified the near clip override processing so that haloes on sensor channels are not rendered on top of ownship geometry. Using the nVidia depth clamp extension.

IData plug-in:

1. Fixed bug where Client Attrib was not being pushed and popped causing a state tracking problem. Manifest as disappearing terrain problem while running ViXsen.

2.3.8 BID 0CBE Notes

Updates/Additions

1. Added a time limit to the number of model clamping isectors that will be processed each frame. The current time value we chose is 0.175ms, which should lead to roughly a 0.3ms max clamping time per frame.
2. Added a means of limiting how much time is spent clamping on each MantisServer. A cient-side environment variable, MANTIS_MAX_CLAMP_TIME_MS, can be defined and set equal to the number of *milliseconds* to spend clamping. An "info" message is displayed in both client and server indicating the value used, and the client about box shows the currently defined environment variable. The default, in the absence of an environment variable, is 1000ms (1 second), which effectively removes the time limit. Clamping proceeds in a round-robin fashion from frame-to-frame, so that, eventually, all models are clamped.
3. Added a check for a file "q3dTexturesThatIdentifyNodesThatClampingShouldIgnore.txt" in the database directory. Texture names listed in this file are used to filter geometry nodes in the paged in terrain and flag them with a new flag "NodeDontClamp". This makes the clamping routines ignore those nodes when performing intersection tests with nearly straight down vectors (within 2.5 degrees currently).

Deficiencies Addressed

1. RN 070302-000001, 070212-000002 – Fixed animation synchronization on IDX tiled systems. Found a couple of problems in the SkipAnimations() method:
    a. 1. Total animation time for non-looping animations was being calculated incorrectly.
    b. Updating lastNodeStartTime was done incorrectly when whole animations were skipped and assigned to wrong child node.
2. RN 070305-000000 - Fixed crash on exit in Detailer when last fx was deleted, iff there were no models in scd file. Cut/paste error, code was checking #models instead of #effects.
3. Various code changes targeted at preventing some of the random MantisServer crashes observed during database changes.
4. Fixed a bug that could cause a database to appear invisible if ‘LOD extend’ processing was enabled and the observer viewport was low in altitude during a database change.
5. Fixed bug where sometimes the texture cache would not initialize and be skipped despite the paging database having a valid cch file. This seemed to happen mostly when running ViXsen probably due to thread contention.

Advanced Ocean plug-in:

1. RN 070329-000000 - Fixed problem with collision segments not hitting the dynamic ocean.

IData plug-in:

1. Fixed a bug where turning off IDX multisample in plug-in caused all multisampling to be turned off (not just for IData). Change included switching to use OGL render context calls to track and change multisample state.

igCigiV3 plug-in:

1. RN 070328-000000 - Fixed problem with ocean clamped models, the clamp type was not being set correctly. If clamping is specified using the EntityControl packet, then the clamp type must be specified in the .scd file, especially for ocean clamped models.

2.3.7 BID 0CA9 Notes

Updates/Additions

1. Implemented CIGI3 rendered placement updates from the server. The updates get sent back as CigiPositionResponse packets and can be requested as one-shot or continuous responses (every frame).

igCigiV3 plug-in:

1. Implemented basic CigiPositionResponse (RN #070109-000001) packet for Entities and Articulated Parts in response to CigiPositionRequest packets.
2. Fixed a bug in which the cloud visibility range was being compared to the general visibility range, this resulted in unexpected cloud layer fog density if the general visibility range was less then the cloud visibility range, removed the comparison.
3. Implemented CIGI3 rendered placement updates from the server. The updates get sent back as CigiPositionResponse packets and can be requested as one-shot or continuous responses (every frame).
4. Hide base class functionality in Mantis HAT/HOT/LOS extension packets to expose only packet features documented.
5. Fixed bug in LightningStrikeResponse packet Decode() method, the EntityID was not being byte swapped.

Deficiencies Addressed

1. RN 070302-000001, 070212-000002 – Fixed animation synchronization on IDX tiled systems. Found a couple of problems in the SkipAnimations() method: 1. Total animation time for non-looping animations was being calculated incorrectly. 2. Updating lastNodeStartTime was done incorrectly when whole animations were skipped and assigned to wrong child node.

2. RN 070305-000000 - Fixed crash on exit in Detailer when last fx was deleted, iff there were no models in scd file. Cut/paste error, code was checking #models instead of #effects.
3. Fixed a crash bug that occurred because the CFS file callbacks were not removed from the dynamic loader object before the MNP format handler was destroyed during a database switch.
4. Fixed render order problems with attached models due to render bin not being updated every frame.

2.3.6 BID 0C8C Notes

Updates/Additions

1. Updated Fade LOD blend calculations for one lod blending to utilize the entire blend range, instead of one-half the blend range.
2. Added sorting and formatting to revised CCH file for VBO entries.
3. Added support for new 16-bit 1-pass sensor support, subproduct 12: ViXsen16Fast.

Deficiencies Addressed

1. Fixed a big memory leak with the clouds whenever the eyepoint altitude changed. This was revealed by the previous far clip syncing change. The real problem was that the igHostCloudLayer::BuildGNode() called vtNode::RemoveChildren() instead of vtNode::DelChildren(), RemoveChildren() does not actually delete the nodes from memory, resulting in a memory leak.
2. Removed check against scaled sky model radius used to sync the cloud geometry, this test was deemed redundant since the far clip was already being checked for changes to update the cloud geometry.
3. Fixed a bug where VBO cache entries with zero size or zero count were not ignored. This was causing an "Internal Error" warning in the MantisServer logs. Now these entries are silently ignored.
4. Fixed a memory leak when switching MNP databases caused by the m_ContainedInTextureCache variable not getting set to false when the texture's cache was set to NULL. These changes were in vtTexture.cpp.
5. Fixed bug in texture cache processing for PMM images. No mipmap information was being used which prevented the texture from being matched to a cached texture.
6. Fixed bug that resulted in revised CCH texture information for sensor channels being written to the revised visual CCH file.
7. LightpointTracer FX:
   a. Fixed tracer fx so that it will work properly if only a Restart() or Stop() is commanded without ever sending a Start().
   b. Fixed reference counting problem that was causing a crash.
   c. Fixed particle trajectory in geocentric mode.
   d. Changed velocity defaults in Detailer to match CIGI coordinate system.

8. Changed igVtTemplateFormat::HaloedLightCB method return from "0" to "1". Returning 0 was causing *all* callbacks to terminate, not just ones of this type. It also is causing a warning message to spew in MantisServer.

Advanced Ocean plug-in:
1. Added support for newer 1-pass 16-bit rendering used in ViXsen.

CelerityGUI:
1. Updated CelerityGUI to v1.4.12.
2. Updated logic to look find config sensor files in bin directory
3. Update logic to save/restore perform/force flags from cpf unless running from cmd line.
4. Added debug logic to test vertex cache performance.
5. Moved coarse sensor texture generation until after vt generation, to ensure that coarse OTW files have been generated first.
6. Added Software Texture Compression Option.
7. Added Force Software Texture Compression Option.
8. Updated logic for detail texture name in sensor.
9. Added Force Software Compression to override hw compression which fails on some machines/drivers.
10. Updated feature blend transition logic to preserve OpenFlight transition ranges.
11. Added call to expand tile boundaries for crack prevention.

2.3.5 BID 0C80 Notes

Updates/Additions

1. Updated the cloud layer texture matrix processing code to use absolute positions, replaces the old integration method, these changes address seams in clouds on tiled IDX systems. Currently the first server provides a geodetic position reference.
2. Added SecondaryViewportEffect to allow ocean reflections and ViXsen 16 bit rendering to live in harmony.
3. Updated Fade LOD blend calculations for one LOD blending to utilize the entire blend range, instead of one-half the blend range.

Deficiencies Addressed

1. Added a method called DelimitedString() to igPropertyList that is called when writing out the property list name. This fixes a problem when writing/reading property lists that have names containing spaces or tabs.
2. Fixed a problem with clouds not rebuilding their geometry when the scaled sky model radius changes. This was causing seams to appear in the clouds randomly, forcing a far clip change would fix the problem.

igCigiV2/igCigiV3 plug-ins:
1. Fixed RN #070109-000003 (CIGI near clipping plane adjustment not working).

2. Fixed bug that erroneously deleted packets during Standby to Operate mode processing
3. Updated logging stats to include all CIGI packets, not just IgControl and EntityControl
4. Added code to track packet processing
5. Added entity and effect interface methods. Useful for receiving notification of entity and effect adds/removes and accessing the entity and effect lists.

igCigiV3 plug-in:

1. Fixed problem with Short Component control packet processing when updating the screen blank color. The component data was not being preserved.

Advanced Ocean plug-in:

1. Increased resolution to make star reflections smaller. Reduced size of moon to more correct size for reflections.
2. Fixed problem with ocean fogging incorrectly when view is inside 2D cloud layer in ViXsen.
3. RN 070118-000000 - "Mission Function Processor LOS returns over ocean with Advance Marine Effects Plug in". Added a call to the scene pre-render callback in igHostGraphicsServer::PerformNonRenderedViewportCallbacks() and early return from Advanced Ocean render method if rendering is disabled on channel.
4. Switched the reflection shader to use the new SecondaryViewportEffect so that it does not conflict with ViXsen 16 bit rendering.

Volumetric Clouds plug-in:

1. Fixed problem with Hi LOD clouds not being rendered when Haze Model is not set to Mantis General Visibility.

IData plug-in:

1. Fixed a bug in which channel names containing a sub-string which exactly matches the name of another channel would be assigned an IData overlay. e.g. "Fwd" and "Top Fwd" would both get an overlay if the overlay, even if the overlay was only assigned to channel "Fwd".

2.3.4 BID 0C6D Notes

Updates/Additions

1. Updated CelerityGUI to v1.4.4.

Deficiencies Addressed

1. RN 070117-000002: igCigiV3 - Fixed problem with scaling of 2D clouds via CIGI3.
2. RN 070117-000004: igServer - Fixed bug which prevented child models in geocentric terrains to dead reckon properly.

3. RN 061222-000003: igServer – Fixed problem where the ‘Rendering Disabled’ screen was not visible when using textured rain and channel rendering was disabled.
4. RN 061215-000003: ShadowPlugin – Fixed problem with shadows disappearing with textured rain enabled.
5. RN 070117-000003 - Added code to clamp the cloud altitude to a minimum of 1.0 dbu. This eliminates a render order problem that occurs when a cloud is set to 0.0 dbu altitude, conflicting with the terrain whose altitude is assumed to be a 0.0 dbu.

Advanced Ocean plug-in:

1. Modified time reset so that it gets deferred until all IG's are synchronized. This should fix problems with the ocean coming up out of sync at start up.

Known Issues

1. Under heavy load rendering conditions it is possible for seams to appear in the 2D clouds on tiled IDX systems. This problem will be corrected soon.

2.3.4 BID 0C68 Notes

Updates/Additions

1. Added code to set the name of the temporary 'forceList' texture list, which is a reference to the TexturesRequiringRendering() texture list, while the textures in this list are being processed. Previously the name of this list was getting set to the name of the 'retryList' and this resulted in the TexturesRequiringRendering() texture list being named 'retryList'.
2. Added GetVertexTextureCoords()methods to vtGeometryNode class to retrieve texture coordinates from vertex streams. Cloned new methods from vertex position methods.
3. Implemented vtImageDDS::GetTexelColor(), which was not implemented for compressed textures.

Deficiencies Addressed

1. RN 061120-000025: Advanced Ocean - Fixed bug with shoreline. For IR, it was using the ocean material instead of the shore material for blending.
2. RN 060213-000005: VTree fix - Fixed a crash bug that occurred if the number of particles was set to 0.
3. RN 061120-000013: CIGI30 - oblique color was being encoded as float but decoded as integer in CIGI3 processing.
4. RN 061120-000008: ChannelMask plug-in - some channels could get the wrong mask, fixed bug with name comparison.
5. RN 061120-000021: IData plug-in: Fixed bug that caused numbering on HUD layout to disappear if there was geometry with multi-texture in the scene, fix was to force a selection of texture unit 0.

6. RN 061213-000002, 061215-000002: DiGuy6 plug-in: Fixed a crash in vtFxDiGuy::ReplaceTexturesWithMCMs() when the texture could not be found, the pointer was not being checked for NULL.
7. RN 050404-000002: Detailer - Editing the Intensity field manually from 0 to 1.00 doesn't affect the intensity of the lights. Set intensity scale appropriately.
8. RN 060206-000006: Standard Ocean plug-in – fixed problem with standard ocean geometry not getting fogged, either in or out of a cloud or scud, or by general visibility settings. Fog coordinate in the CG vertex program was not getting set properly.
9. RN #060815-000007: Thunderstorm - fixed bug where thunderstorm severity states were not uniquely depicted in each thunderstorm model. Solution was to force creation of unique rain material object for each thunderstorm.
10. RN #061120-000006: Thunderstorm – fixed problem with in-thunderstorm visibility not always working.
11. RN 060206-000006: Standard Ocean plug-in – fixed problem with standard ocean geometry not getting fogged, either in or out of a cloud or scud, or by general visibility settings. Fog coordinate in the CG vertex program was not getting set properly.
12. RN 060206-000014: Audition - Fixed problem with F6 not working properly as a jump point position.
13. Fixed 050413-000004: Audition - Changing the FOV field has no affect on the FOV slider.
14. RN 060224-000003: SpliceTree - Depiction dialog was allowing selection of non-zero depiction level even though only 1 depiction was allocated.
15. RN 061120-000024: igServer - Fixed problem with flickering on 2D cloud layers. Increasing the tessellation allows per-vertex atmospherics to have smaller variation as ownship moves and thus fixing the problem.
16. RN 061212-000000: SpliceTree - Added Sleep() after rendering is done to allow GUI responsiveness on hyper-threaded dual core machines.
17. Fixed bug that prevented shader lightpoints with glow from rendering correctly if polygonal shadows were enabled. Problem was the lightpoint glow code was retrieving its information from viewport 0, which is not always the main viewport. Shadow viewport is installed as viewport 0 to reduce rendering latency.
18. Fixed a crash caused by unchecked pointer in BindShaderEffect(). Saw this when debugging the Innsbruck demo.
19. Fixed uninitialized variable: m_Viewport in vtRenderContext.cpp.
20. Fixed bug in SkipAnimationFrames() that was inadvertantly skipping frames based on a bad tail out time. This was causing a performance degradation over time when rendering the afterburner animation on the Sapura program.
21. Fixed error message bug for unable to load spotlight texture.
22. In vtImagePMM::CreateGlobalMaterialMixtures() added return value indicating success, and added an optional argument to return invalid material indices for error reporting by the caller.
23. Fixed problems with GUI data getting out of sync with the plug-in data if a change is made without Applying it and then switching tabs. This change was made to the

following: IData plug-in, CachedFiledServer plug-in, Standard Ocean plug-in, Advanced Ocean plug-in, VolumetricCloud plug-in.

24. Fixed bug in animation node processing that didn't advance the node start time properly when whole animation frames were skipped. This caused unnecessary spinning in the AdvanceAnimationFrames() which was affecting render time.
25. Removed change of vtLightPointGlow images to sensor types (pmm and mcm) because it is unsupported in sensors.
26. Fixed a problem where the database did not always page in properly if the NFOV processing was enabled. Problem had to do with trying to re-use the last terrain hit position if the isector used for NFOV processing missed, but this position was not valid during startup or after hyperjumps.
27. ThunderStorm:
    a. Fixed scaling problems with the lightning when the thunderstorm altitude or scale factor is changed.
    b. Fixed bug that caused extra rain falling transform nodes to be added.
    c. Fixed rain falling matrix classification problem that prevented the rain texture from animating.
    d. Re-factored the FindLightning() method and fixed bug that prevented the rain geometry from being found in the scene graph if the rain failing transform node had been added to the scene graph.
    e. Fixed bug that prevented the rain column from sizing properly when the thunderstorm altitude was changed.
    f. Fixed problem with rain column improperly blending with the terrain. Added a separate rain geometry entity that is rendered independently of the thunderstorm model, but uses the rain geometry from the thunderstorm model.

MantisClient:

1. Fixed a bug with command line configuration file processing, if there was no path to the config file then the file may not be saved to the correct location. If the config file does not include a path, then the current working directory is pre-pended to the file name.
2. Fixed a bug in which GUI created clouds did not render fog when the eyepoint is inside the cloud. Add call to set the coverage to a non-zero value.

MantisServer:

1. Modified the DumpTxpSceneGraph() and DumpModels() methods to only dump the basic entity tree and omit the vtFadeEntity scene graph overhead.
2. Added a glViewport call to ensure stats render in the proper viewport.

Detailer:

1. Changed the Cluster Fx list in Detailer to be unsorted, fx's are rendered in the order they appear in the cluster fx list.
2. Added a color "patch" to the particle system color table, which can be clicked to choose a color instead of entering numeric values. Alpha (transparency) still must be manually entered, however.

Standard Ocean plug-in:

1. Made m_EffectControlNode an auto-pointer, this fixed a reference issue that caused a crash in CleanVtObjects() during shutdown.
2. Made call to m_DebugRectLock.Lock()/Unlock() conditional on m_ShowDebugRects, this was necessary so that the plug-in could be debugged since calling the Lock() method was causing a crash in the debugger.
3. Modified previous checkin to use absolute value of planar distance posInEyeSpace.z, instead of using the expensive length() method to compute the radial distance.

Advanced Ocean plug-in:

1. Fixed a bug where enabling advanced ocean after starting Mantis could take an excessively long time. A call to vtFile::UnlockFileAccess() was added to allow shaders and textures to be read without pacing interference when the ocean is being enabled.

IData plug-in:

1. Added a stencil buffer clear to fix a rendering problem (hidden parts of HUD were rendered) if the Advanced ocean was rendered behind the HUD.

2.3.3 BID 0C5A Notes

Updates/Additions

1. Added ability to set the upper and lower angles of the skirt haze in the skymodel.dat file using the UpperHorizonHazeAngle and LowerHorizonHazeAngle keywords.
2. Added support for SetPlacement(), SetOrientToParent() and SetMoveWithParent() for cluster fx's.
3. Added vtWindow::ResetStartTime() method so that the window start time could be modified when server side syncing to client time occurs. This fixes a render stall that can occur if the server is started before the client.
4. Added support for vtEntity’s knowing about shadow geometry and their DOF and Switch nodes automatically updated when their normal geometry counterparts are updated in igHostModelPart::SyncPlacement(). This eliminates the need to updating the model’s DOF table to provide the same functionality.

Deficiencies Addressed

1. RN 060124-000011 - Changing entity opacity of a special effect will not work. Updated code so that fx's attached to faded entities also fade.
2. Fixed problems when setting up fx in Detailer using the wind, vector and texture size tables. While the fx looked correct in Detailer, they didn’t render properly in Mantis or vice versa.
3. Fix for flashing scene when reflections are turned on for Advanced Ocean in ViXsen.

4. Fixed a bug where the channel eye offset was not being applied correctly when computing the channel viewing frustum in MantisClient when setting up channels.
5. Fixed a Detailer shutdown problem, the error message dialog was destroyed but still trying to print a message during shutdown causing a crash.
6. Fixed a bug in which the fx restart time was not being set and so fx's with time offsets started at 0 time instead of the specified offset time.
7. Fixed cluster fx code omission, could add fx's which are part of a cluster fx to a model, but could not remove these individual fx's.
8. Fixed a problem with fx's loaded as part of a cluster fx getting added in random order. This resulted in inconsistent render orders across different IGRs on IDX systems.
9. Fixed problem with synching texture scale, made it appear as though the missile trail wasn't starting or rendering.
10. Fix for tile time-of-day inconsistency when moving the viewpoint up or down fast enough to cause ephemeris model updates (especially skirt color changes) due to updates being asynchronous.
11. Fixed a bug in which the precipitation was not sensitive to the cloud layer enable on the client GUI. So if precipitation was enabled and eyepoint was above highest cloud, no precipitation was rendered, disabling cloud layers should have caused the precipitation to render, it didn't.
12. Fixed bug in which paused particle sfx would appear as zombie particles.
13. Compute a renormalized time that includes the color variance bias. This fixes a popping problem with particle fx if the particles don't go through the entire color table before the particle times out.
14. Reverted the RenderBin() processing order code so that trees blend properly with the clouds at the expense of not supporting terrain intersecting clouds if the eyepoint is between the terrain and the clouds.

IData plug-in:

1. RN 060828-000002 – Fixed server crash with IData and no channel overlay file. Provided a viewport if none had been created (as happens when no channel overlay is set and an entity overlay is set).

i*gCigiV2 plug-in:*

1. Fixed crash bug which occurred when the Mut framework was closed after creating an sfx of an sfx as is done in the IITSEC06 Fly MUT. While CIGI sfxs with children is not technically illegal, it wasn't expected and the code did not properly handle the parent sfx being deleted and then the child sfx. The child sfx still had a pointer to the parent sfx which was now bad.
2. Made some tweaks to fx control in the CIGI plug-ins, fx are now stopped if they are set to LoadHide (CIGI2) or InactiveStandby (CIGI3). These changes were made to make cluster fx's control more predictable.
3. Modified the WaitForSendTimeNVSync() method to update the m_NextMessageTime variable so that it is in sync in case hardware sync is disabled and start using the WaitForSendTime() method. This happens when Mantis is commanded to Standby mode and then back to Operate mode. Can get in a situation

where the sender thread is constantly sending SOF messages until the m_NextMessageTime variable catches up with the current time.
4. Fixed an fx restart problem when an fx is loaded but hidden and then made visible.
5. Modified the code so that data sync only occurs if Mantis is in Run or Debug mode, not Standby mode. This fixes a problem where Mantis was still rendering right after startup, even though there was no CIGI traffic from a host. This was also causing a data sync time of 0.0 to be sent to the server(s) and used to sync the server time to client time.

igCigiV3 plug-in:

1. Changed HOT request altitude from 100000 to 0, this matches what's in the CIGI2 plug-in and eliminates an erroneous biased result that was different from the CIGI2 plug-in.
2. Fixed crash bug which occurred when the Mut framework was closed after creating an sfx of an sfx as is done in the IITSEC06 Fly MUT. While CIGI sfxs with children is not technically illegal, it wasn't expected and the code did not properly handle the parent sfx being deleted and then the child sfx. The child sfx still had a pointer to the parent sfx which was now bad.
3. Made some tweaks to fx control in the CIGI plug-ins, fx are now stopped if they are set to LoadHide (CIGI2) or InactiveStandby (CIGI3). These changes were made to make cluster fx's control more predictable.
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5. Fixed an fx restart problem when an fx is loaded but hidden and then made visible.
6. Modified the code so that data sync only occurs if Mantis is in Run or Debug mode, not Standby mode. This fixes a problem where Mantis was still rendering right after startup, even though there was no CIGI traffic from a host. This was also causing a data sync time of 0.0 to be sent to the server(s) and used to sync the server time to client time.

Advanced Ocean plug-in:

1. Fixed problem with ocean reflections interfering with ViXsen 16 bit mode sonce they both use a vieport effect and only one at a time is allowed. Now made it so that if ViXsen 16 bit mode is enabled then ocean reflections won't be present.
2. Fixed bug in which the OceanSelectIsectPreChildCB() method was being installed as the RenderPreChildCallback for the callback node instead of as the IsectPreChildCallback. This allowed isector processing against the MNP terrain to work even though it should be disabled and isector processing should be done by the ocean plug-in.
3. Fixed mission functions to comply with ocean disabled state.
4. Fixed ocean geometry sync enable startup issue
5. Fixed problems with ocean atmospherics. Added ability to get ViXsen fogging.

Standard Ocean plug-in:

1. Fixed bug in which the OceanSelectIsectPreChildCB() method was being installed as the RenderPreChildCallback for the callback node instead of as the IsectPreChildCallback. This allowed isector processing against the MNP terrain to work even though it should be disabled and isector processing should be done by the ocean plug-in.

Volumetric Clouds plug-in:

1. Fixed problem with volumetric cloud parameters not getting set correctly into igGraphicsServer at start up.

2.3.2 BID 0C50 Notes

Updates/Additions

1. Added code to sync the server side time using the client time when data sync is first enabled.
2. Added 2D cloud texture scale control via CIGI component packet for both CIGI2 and CIGI3 plug-ins.
3. Changed point where fog is turned off to highest cloud layer + transition instead of just highest cloud layer.
4. Added static member const to determine scale factor used to modify effective transition zone based on near clip. Fixed bug where fogging was turned off when above highest cloud layer but not out of transition zone.
5. Texture cache changes: vtTextureCacheExt.h/cpp moved to VTree4/src from the dynamic loader directory.
6. Textures made aware of the main texture list in vtRenderContext and of a source texture cache into which they will return when their reference counts drop to 0.

Deficiencies Addressed

1. RN 061019-000001 - fixed problem with plug-ins timing out but sometimes still working. Traced this to fx plug-ins causing two CreateRemoteObject() calls to be made. Fixed client side to only do this once and added code on server side to check to see if the plug-in library has already been loaded.
2. RN 060524-000006 - Added support for CleanVtObjects() processing for plug-ins like Ocean, Shadows, DiGuy, etc. so that these plug-ins can free their VTree objects in the render thread.
3. RN 061027-000000 - Added NULL pointer check to RemoveProperty method.
4. RN 060127-000007 - CalculateVisibility does not factor in the coverage value. So, even with a 0% coverage (resulting in an 'invisible' cloud layer), when inside the cloud boundaries visibility was impaired. Fixed by checking for zero coverage at the top of CalculateVisibility. If zero, just return false (which essentially fakes out any calling code to think the eyepoint is not within the cloud boundaries).

5. RN 061101-000002 - Fixed problem where cloud entities were being created before the VTree scene was created, so the cloud entities were not being added to the scene. Only seemed to be a problem for GUI based clouds at startup.
6. RN 061002-000002, RN 061004-000008 - Mantis servers crash with specific scd files. Error was when we encountered certain texture mirror properties that ran into a section of code that produced a data index computation error causing crash.
7. RN 060829-000001 - fixed problem with special effects attached to models above the highest cloud layer still getting fogged, even though parent wasn't.
8. Fixes for problem with 2D cloud layers projecting below 3D clouds when in geocentric mode and far clip plane is fairly close.
9. Fixed problems with CIGI3 control of fx not working properly.
10. Fixed problem with special effects not sorting corrently with cloud layers, added extra render bins so that each entity for each cloud layer is in its own render bin.
11. Removed server side time sync code using the discover message which turned out to be problematic, now using the client time when data sync is enabled.
12. Tweaked the data sync enable code, added a call to reset the data sync and software frame sync events when these are enabled, otherwise the render thread could get stalled waiting on data sync during this transition.
13. Fixed issue with lots of error messages in popup dialogs when Audition shuts down. This was happening when textures were deleted from the texture list when trying to remove the NameChanged callback. This failed since the vtObject::NameChangedReason pointer was non-NULL but no longer valid since vtReasons list had been cleared. So the following steps were taken:
    a. Make the vtReasons list contain auto-pointers.
    b. Changed the vtObject::NameChangedReason to be an auto-pointer.
    c. Due to static memory startup issues made some objects like sm_Textures in vtRenderContext a pointer and deferred initialization to when the first render context is created.
14. Changes to spotlight texture binding during mute/unmute in order to recoup performance lost in a previous change.

CigiTestGui_v30:

1. Fixed history issue where some configuration data doesn't make it back into dialogs when reloaded.
2. Disabled HatHot base class options that should not be available for these packets on the dialog tabs.

IData plug-in:

1. Fixed overlay positioning bug.

igCigiV3 plug-in:

1. Fix for LosSegmentRequest packet requestType not getting passed to the LOS Isector in the packet handler.
2. RN 060731-000000 - Using CIGI 3 to clamp entities. Re-added code needed to implement this feature (that was inavertently removed).
3. Fixed problems with CIGI3 control of fx not working properly.

4. Modified CheckIsectors when handling LOS responses so that they also return the Entity ID of an entity that was hit.

Advanced Ocean plug-in:
1. Fixes to ViXsen with Ocean while traversing cloud layers.

Volumetric Clouds plug-in:
1. Made it so that cloud shadow enabling is independant of cloud enable - so now you will get shadows whenever the shadows box is checked.
2. Fixes for problem with 2D cloud layers projecting below 3D clouds when in geocentric mode and far clip plane is fairly close.
3. Fixes to remove tiling seams in video wall type applications.

PmmDump:
1. Moved options before file spec on command-line.
2. Added support for wildcards in the file spec.

2.3.1 BID 0C42 Notes

Updates/Additions

1. Added check in MNP loader for local physical drive when opening the database. If the drive is local then the CFS interface is disabled. If the drive is remote, then the original environment variable is checked as before.
2. Advanced Ocean: added fogging for ocean in sensor mode.

Deficiencies Addressed

1. RN 060912-000003: MantisClient would crash if File→Open dialog was used to right click a file and try to edit the file.
2. RN 060912-000005: Fixed erroneous error message about light-groups when adding new models to the .scd file.
3. RN 060906-000004: IData plug-in did not have a GUI tab name, so when the ViXsen plug-in was removed, which includes an unnamed plug-in entry, the IData plug-in was being matched and removed as well, added code to set GUI tabname.
4. RN 061013-000002: Fixed crash when switching CIGI plug-ins, old properties were left in the main property list.
5. RN 061012-000006: Spamming warning message about Cg Error 2 while volumetric clouds are enabled.
6. RN 060829-000006: A third spotlight should no longer cause problems with terrains with detail texture. Texture binding fix detected by state tracking: binding a texture with a different dimensionality than the currently bound texture could result in incorrect bindings.
7. Changed the VLOS list in the MantisClient Stealth tab to be a list of auto-pointers.
8. Updated Mantis_CIGI_v2.0_Extensions.pdf document:
    a. Removed extra 5.21 section.

   b. Added Sensor Halo enable section.
   c. Added Max AGC Gain section.
9. Updated Mantis_CIGI_v3.0_Extensions.pdf document:
   d. Added Sensor Halo enable section.
   e. Added Max AGC Gain section.
   f. Added Diurnal temperature section.

CigiTestGUI_v30:
1. Fixed serialization issues causing crashes/lockups.
2. Added the Message History dialog
3. Changed the main menu to show 'History' instead of 'Messages'.
4. Saves/shows up to 10 recent messages for recall.
5. Saves/loads arbitrary message configuration settings.

2.3.1 BID 0C2C Notes

Updates/Additions

1. Added 'quiet' command line option to MantisClient, same function as for MantisServer.
2. Added code to sync the vtTime() and fmTime() methods between client and server(s).
3. Added support for enabling/disabling nVSync System Video Reset, this is for those customers that use display devices, e.g. projectors, that cannot tolerate loss of video syncs.
4. Added support to optionally clear the message log after an auto-log event.
5. Added checks on reliable UDP com channel read buffer size to prevent buffer from growing without bound if the thread reading the data gets stalled, this was causing an out of memory condition that sometimes crashed NVIS channels on CFS systems, also added CFS debug code (ifdef'd out).
6. VTree state tracking changes to accomodate shader texture unit bindings.
7. Added code to reset the cloud geometry (i.e. texture scroll DTNode) on data sync change.
8. Celerity: Added support for SpeedTree plug-in.
9. OpenFlight2VTree: Added a feature to auto-generate unique bounding volume IDs if commenting is not found.

Deficiencies Addressed

1. In the reliable UDP com channel fixed problem with written data getting fragmented even when flushed appropriately to prevent it.
2. Fixed problem with rain effect not being rendered correctly when viewport near clip plane was above around 4.
3. Fix to particle systems so that they get reflected in the ocean correctly.

4. Fixed several issues in the MNP loader:
   a. Added Initializing() method and processing.
   b. Moved the texture display and definition processing from the render callback to a new viewport pre render callback, this allows the textures to be processed even if the terrain entity is not in the scene.
   c. Twiddled how a texture is moved between the main texture list and the texture cache to prevent the texture from existing in both lists at the same time.
   d. Fixed crash in CloseMndFiles() if the previous attempt to load the database failed.
   e. Updated return error code processing for vtFile based I/O and added code to properly reset the database if the load fails.
   f. Added some debug messages in Request() and Cache() to check for unexpected callbacks.
   g. Added code to remove these unexpected callbacks in case using them could cause a crash.
   h. Fixed bug in MNP loader when replacing global texture with same named texture in cache, the result was the texture was added twice to the texture this and could start seeing warning messages about not being able to remove 'Name Changed' callback.
5. Fixed a problem where models could not be re-parented via CIGI, tracked to an issue with autopointer comparisons.
6. Replaced fixed length character arrays with STL vector in message processing and string tokenizing.
7. Since the _tzset() method was causing problems with ViXsen (forcing an update due to timezone change), updated the logging code to use GetLocalTime() which does not require the _tzset() method to be called to retrieve the correct local time.
8. Fixed problem with texture precipitation method with bad non orthonormal model matrix being generated when moving in certain directions. This caused the rain/snow to occasionally get clipped strangely.
9. Fixed a problem with lightpoint glow which caused them to elevate slightly when enabled as compared to the light points.
10. Fixed random crash in vtEntity caused by uninitialized m_ShadeMode member, was not being set in the copy constructor or assignment operator method.
11. Fixed an incorrect winding order on triangle-strip to triangle conversions for geometry node iteration. This caused some intersection tests to fail.

CachedFileServerApp:

1. Added code to the list box message processing to prevent the item selection from occurring if the user is scrolling the control using the thumb buttons.
2. Also added some error processing if an item cannot be added to the message list box.
3. Added code to dump the history if a unknown packet type is received in OnReadReady().
4. Added retry logic in ReadBlocks() if a read attempt fails.
5. Added command history, mainly for debugging purposes.
6. Changed timeout from 100 to 30 sec.

CachedFileServer plug-in:
1. Added code to dump the history if a unknown packet type is received in OnReadReady().
2. Added rety logic in ReadBlocks() if a read attempt fails.
3. Added command history, mainly for debugging purposes.
4. Added base class initializer to vtCfsFile class.
5. Changed timeout from 100 to 30 sec.

Advanced Ocean plug-in:
1. Fixed problem with gap being visible between terrain and ocean at long ranges. This was particularly visible when using a narrow field of view.
2. RN 060814-000006: MantisServer would crash when changing sea states when scene reflections were enabled. This was caused by one too many unrefs being done on the reflection effect.

Volumetric Clouds plug-in:
1. Added city lights functionality.

IData plug-in:
1. Fixed logic bug in clamp to frame buffer sections code. We were always clamping to FB section zero, which is incorrect. Should clamp to the last FB section.
2. Fixed bug reported in 060712-000000 regarding IData Channel Reduction. Server would crash if nVSensor custom rendering was selected but not present.

igCigiV2 plug-in:
Fixes to CIGI asynchronous/asynchronous extrapolation operation. These problems were discovered while working on the Boeing FHS host/plug-in which operates asynchronously.

igCigiV3 plug-in
1. Fixed RN #060731-000000 - EntityControl clamping with SoCal9 database clamps under the terrain.
2. Fixes to CIGI asynchronous/asynchronous extrapolation operation. These problems were discovered while working on the Boeing FHS host/plug-in which operates asynchronously.
3. Changed hardcoded contacted entity volume id from 0 to real value.
4. Added code to compute collision segment distance for proper reporting.
5. Fixed RN #060504-000005 - CIGI 3.0 Hot requests with Report Normals not working. Modified Encode/Decode offsets.

2.3.1 BID 0C05 Notes

Updates/Additions

1. Changed the thread priority boost to be done by default, so the env. var. MANTIS_ADJUST_THREAD_PRIORITY_BOOST is now used to disable this action.
2. Added code to override MNP "global textures". If a texture is found with the same name as a global texture, the local texture is used instead of the embedded MNP global texture. An "info" message is displayed at the server indicating the substitution.

Deficiencies Addressed

1. In CachedFileServer plug-in and CachedFileServerApp, fixed a bug in the error case of CreateFile() in OnOpenRequest(), bogus error message was printed and unnecessary SendOpenCommand() was executed.
2. Fix in graphics server for the server window not processing windows events except sporadically.
3. Fixed bug in position smoothing. Y was being put into Z filter (cut-and-paste error obviously).
4. Fixed a bug where model template DOFs were extrapolated every frame. Now only occurs for actual model instances.
5. Fixed a bug that could leave a texture with a callback into a temporary texture list that is no longer valid, resulting in a crash when the texture is deleted from the main texture list.
6. Updated the vtTexture::Define() code to lock the main texture list, this prevents other threads from trying to delete the texture while it's being defined.
7. Fixed a bug in which the main texture list was being locked during a MemoryUsage() call, instead of locking the objects texture list. This resulted in a thread deadlock situation.
8. Fixes for memory leaks while paging databases.
9. Fixed some problems with the CCH processing and cacheing of textures in the dynamic loader module. These were caused by previous checkins for forcing all textures to be defined in the render thread.
10. Fixed a potential crash in the dynamic loader module if the name of an mnd file was greater than 1024 chars.
11. Fixed a crash during database cleanup processing if the database had not been fully loaded.
12. Dynamic loader module:
    d. Moved texture defining to a new viewport pre render callback.
    e. Added new Initialize() method.
    f. Added new WaitForTexturesDisplayed() method.
13. Restored the callback locks in vtObject and improved some debugging messages.
14. Fixes for lightpoints:
    a. RightNow incident 060801-000000.
    b. Bidirectional lights now properly change colors again to their anti-lobe color.

   c. Lights no longer blend with the background unless they are actually transparent.
   d. Fixed a recent bug introduced during code cleanup causing bidirectional and unidirectonal lights to not attenuate properly with angle.
15. Fix so that the particle effects work properly when shaders are being used (e.g. when using ViXsen).

Advanced Ocean plug-in:

1. RN 060825-000001 - holes in ocean with certain values of mesh size. Odd values for mesh size would cause holes due to the LOD scheme used. Modified the code to internally round up mesh size to an even value.
2. RN 060825-000002 - crash with small polygon scale values. Some div by 0 errors occur in code when poltgon scale time mesh size is less than some value. Modified code to clamp these values internally to prevent this product from getting too small.
3. RN 060814-000007 - server crashes with sea state too or below and polygon scale less than around 0.5. Fix is to make polygon scale have no effect in sea state 2 or below.
4. Fixed problem with wakes being luminous at night.

Volumetric Clouds plug-in:

1. RN 060825-000003 – Fix for server that would crash with high out of range values for H or V fidelity. Fix is to clamp these values to a sensible range before using them.

2.3.0 BID 0BEB Notes

Updates/Additions

1. Added support for user defined performance spotlight textures. These textures are added to Mantis via the .scd file in Detailer and use them in Mantis. (SWRI Bowst NRE).
2. Added support for disabling Entity foglight use of the 4 OpenGL lights and using them for regular OpenGL spot and point lights. The CIGI entity light support has been extended to support OpenGL light coefficient specifications, comp. controls 404 and 405.
3. Added a height adjustment to morphing light points to raise them sooner and lower them later during morphing so they avoid falling through morphing terrain polygons.
4. Added a height adjustment to all lights based on their point size to make sure they are not partially occluded by the terrain, regardless of point size.
5. Added a depth offset to all lights to prevent z-fighting.
6. Modified the "Q3D frame buffer section support..." message to only print once and only if the extension is available, fixes unnessary message printing in Celerity on non-IDX hardware.
7. Added support for GL_EXT_packed_depth_stencil to provide stencil buffers support for frame buffer objects.

8. Updated thread priorities to avoid unexpected base priorities when process priority is set to HIGH_PRIORITY_CLASS.
9. Added MANTIS_ADJUST_THREAD_PRIORITY_BOOST environment variable. Set this variable to 1 to enable thread priority boost processing, otherwise leave undefined or set to 0.
10. Changed MANTIS_BOOST_PRIORITY environment variable to MANTIS_BOOST_PRIORITY_CLASS.
11. Added environment variable MANTIS_ENABLE_RELIABLE_UDP_COMM_QUIET_MSGS to control display of debug stats info printed every 10 sec.
12. Modified previous code changes to fix the rel. 80 driver startup crash which broke the cache setup file processing, added texture definition queue to force texture Define() calls in the render thread.
13. Added support for both 32 and 24 bit images for tree icons to fmGui library.
14. VTree CG support changes:
    Added another part to the state tracking hack to fix detail textures, too.
    Added tracking of the detail texture, a 'la the diffuse texture tracking.
15. Updated the vtLight::Define() method to set the OpenGL spotlight direction if the light is attached to a model, otherwise the direction was not being updated if the parent model moved or rotated.
16. vtDynamicLoader: Moved the texture list write locks/unlocks when processing the cache files. This was necessary since the addition of the texture define queue there were instances of a thread bowtie occurring between the render and paging threads, actually only seen during debugging sessions.

Deficiencies Addressed

1. RN 060725-000004 - Fixed rain column not responding to severity by changing code to look for geometry nodes instead of gnodes. Added helpful error and quiet messages. Added height bias to lightning to help lightning bolt origin remain within sloped anvil geometry.
2. Fixed a bug introduced in version 89 (7/27/06) that caused a crash when removing plug-ins.
3. Fixes for Z++ not considering model bounding spheres in determining the dividing plane distance. Models out to 1000m and up to 1000m in radius are now avoided when deciding on a dividing plane.
4. Fixed problem with shadows from spotlights not working correctly when Z++ is enabled.
5. Fixed a problem with VTree state tracking in the vtLightPointVP class during vertex buffer creation.
6. Fixed a startup crash with nVidia 80 series drivers on G71 (GeForce) GPUs or later when a paging database is used, apparently these drivers will not allow texture definition from multiple threads.
7. Fixed a bug with spotlight template Ready() processing.
8. Fixed a bug related to drawing a tabbed dialog with no tabs present using fmGui library.

9. Put in a fix to RemoveParents() to detect the (very strange) condition where m_Parents[*].first is not the same as m_Parents[*].second->Id(). The code simply removes the offending item and re-adds it, letting the next loop iteration remove the re-added item.

Advanced Ocean plug-in:

1. Fixes to make Advanced Ocean plug-in work with ViXsen 16 bit AA modes.

Volumeric Clouds plug-in:

1. Fixed problem with clouds being rendered incorrectly when using ViXsen and using an atmosphere model other than Mantis General Visibility.

2.2.6 BID 0BEA Notes

Deficiencies Addressed

1. Fixed a potential thread deadlock situation that could occur during startup of paging terrains.

2.2.6 BID 0BE9 Notes

Updates/additions

1. MantisClient:
   a. Changed the version information saved to the messages file to be the version shown in the About box
   b. Factored the version code into new function named AppVersion().
   c. Added version information to the GPF handler dialog.
2. MantisServer:
   a. Changed the version information saved to the messages file to be the version shown in the About box.
   b. Factored the version code into new function named AppVersion().
   c. Modified the "Save Log" behavior to log directly to the diagnostic path sent from MantisClient instead of popping up a file dialog. If MantisServer is not yet connected to MantisClient, then a dialog will be displayed.
   d. Added version information to the GPF handler dialog.

Deficiencies Addressed

1. RightNow Incident #060710-000000. Fixed problem with animations getting out of sync along IDX tile boundaries. Problem occurred if animations skipped whole frame sequence usually when animation came into FOV, the skip code did not sync to frame 0 in absolute time.
2. RightNow Incidents #060710-000006, #060711-000003. Fixed a bug where GNodes with inherited texture state were no longer inheriting that state after being converted to GeometryNodes.

3. RightNow Incident ##060725-000004. Fixed bug where thunderstorm receives no shading. This was resolved by modifying the vtGeometryNode copy constructor to properly copy material, instead of defaulting to 0.
4. RightNow Incident #060525-000002. Mantis crashes on startup if Standard Ocean is enabled at startup with SoCal9. Fix is to prevent ocean setup code from executing until the database is actually ready. Checks lat/lon values for out of valid range condition to indicate if ready.
5. Fixed a render thread/paging thread contention problem with rel 80 nVidia GeForce drivers with IGR4s on IDX3000, these threads would hang in the driver under certain conditions such as using SoCal9 without a .scd file. The fix is to create temporary objects during initialization in the render thread so that these objects (vtLightPointNode, vtGlSLEffectPass and vtPBuffer) can resolve their OpenGL extensions.
6. Fixed rain column not responding to severity by changing code to look for vtGeometryNodes instead of vtGNodes. Added height bias to lightning to help lightning bolt origin remain within sloped thunderhead geometry.
7. Fixed a logic error that allowed scene graph modifications in the paging thread to delete light point nodes that had already been queued up for rendering in the current frame, and would later be dereferenced as freed memory. Really bad.
8. Fixed a VTree state tracking problem with vertex buffer creation in the lightpoint shader class.

2.2.5 BID 0BCF Notes

Deficiencies Addressed

1. RightNow Incident #060725-000004: Fixed bug where lightning report is in wrong world location.
2. RightNow Incident #060710-000001: Fixed a VTree state synchronization problem when using CG effect shaders. With the introduction of CG 1.4 there were instances when models using Phong shading would cause loss of texture on other models in the scene e.g. ACME BOT trainer.
3. RightNow Incident #060711-000006: Consolidated and updated multi-threaded access to frame control objects between plug-ins and MantisClient. This fixes a thread deadlock condition that can occur under certain conditions.
4. Right Now Incident #060710-000002. Light points on aircraft were not visible when the aircraft was in the clouds. This fix makes lightpoints get rendered as they are traversed in the scene graph if the entity is inside the volumetric cloud layer - rather than the usual practice of rendering them at the end of rendering the bin. As such, light point glow effects cannot be performed on light points inside the cloud layer - such light points will automatically revert to non LPG rendering.
5. RightNow Incident #060711-000004. Fixed a bug causing continuous paging in NFOV situations. Specifically the m_FrameTargetWorldPos member of the DynLoadViewport was getting used as scratch space during the intersection test, and if the paging algorithm happened to try to use it during that time it would get bogus information.

6. Fixed a deadlock that would occur when the client environment sky time of day slider was drug back and forth long enough for a VLOS update to happen at the same time.
7. Removed the try/catch that was previously added to the igGraphicsServerBase::Ready() method. This changed the original logic and prevented the terrain from functioning properly (stayed at lowest LOD/morphing possibly?) as seen in the SeosDPM demo.
8. Fixed problem in the vtDynamicLoader if the terrain extent was 0.0 instead of specified. This threw off the estimated ownship point when starting up the terrain and caused ViXsen to do 1 extra update. Now it will go near the terrain origin if the extent is 0.0.
9. Fixed a major bug where non-square textures were not correctly downloaded. Only the texture height was being used to determine the number of MIP levels to download. So textures with width > height did not have all MIPs downoaded.

Mantis Native Paging plug-in:

1. Fixed unprotected pointers, causing Mantis to Crash in SyncFile when the scene or window pointers were NULL.

2.2.4 BID 0BA4 Notes

Updates/Additions

1. Modified the code to only load the special VTree textures for spotlights, attenuation maps and omni-directional volume light if the render context will be used to render a visual or non-sensor image. This is done to save memory on the GPU. Also added an environment variable: VTREE_DEFINE_SPECIAL_TEXTURES, to override this behavior.
2. OpenFlight2VTree: added controls for selection of object, polygon or blend transparency and modify material with current transparency value. RightNow #060619-000002.
3. Added code to clear the front and back buffers when a window is created, this was necessary to eliminate flashing on spanned channels in Mantis on IDX under configurations with IData, ViXsen, etc.

Deficiencies Addressed

1. Fixed a bug where the sensor CFS channel may not be correct during initialization.
2. Fixed problem when logging recycles and Clear() is called, the buffer pointer was getting set to zero and all of the id information was being overwritten. RightNow #060616-000000.
3. .RightNow #060615-000014 and 060615-000015 fixed. This prevents a crash in Detailer and other potential issues related to when running on a system without the needed OpenGL extensions (insufficent graphics card capability). The models will still not render completely (or at all) if they require the OpenGL extensions. The solution is to upgrade the graphics card or move to another system.

4. CFS application, improved performance for handling missing files. Added a SendOpenCommand() with handle = 0 to accomodate missing external references. This speeds up loading by by-passing the event timeout
5. Fixed intermittent problems with database loading. RightNow # 060615-000004.
6. Fixed problem requesting database change between Korea_005 and MtnHome VDB 2.00 will causing hangs. RightNow # 060501-000003.

Rotor Wash plug-in:
1. Spot-light particle shader bug fixes.
2. Tweaking the ownship view night ambient illumination. The ownship view, during very dark scenes, was glowing a bit due to the backgroubnd clear color not being adjusted by the global ambient lighting.
3. Fixed the ownship view "scrubbing bubbles" state problem.

Advanced Ocean plug-in:
1. Fixed problem with bow spray stopping when the effect gets reset.
2. Added check against m_RC being NULL when retrieving AnimationTime().
3. Changes to make foam and spray texture rotate corrctly with the wind direction. Previously it was quantised to 0, 90, 180 or 270 degrees.

igQuest plug-in:
1. Added some quiet messages to record the Quest I/O times.

igCigiV2/igCigiV3 plug-ins:
1. Added check for IsNVSyncMaster() in conditional at bottom of ThreadUpdate() when determining if a re-sync is necessary which is done by waiting for the next SOF event.
2. Changed the arbitrary 2 ms timeout on terrain sync to be based on VSYNC time.
3. Replaced the 4 ms timeout for SOF callback handlers with a variable timeout based on 80% of the sender thread slack time.
4. Changed a couple of waits to use event based wait which use less CPU on non-nVSync systems.
5. Modified the code which prints a warning message if it takes an excessive amount of time to submit a packet from the receiver thread to the client thread, the original timeout was 1 ms which was arbitrary, now the message is printed only if the time exceeds the next VSYNC time.

2.2.3 BID 0B95 Notes

Updates/Additions

1. Added stats level 3.2 - memory metrics.
2. Updated exception dialog to include the actual data, same information as printed to file.
3. Added call to increase the timer resolution to 1 ms., same as in MantisServer, this is recommended by Herb to reduce interrupt or thread latency.

4. Downsized the paging indicator.
5. Updated VTree code so that all vtObject based objects have a valid name and class in the vtObject base class, this was done to help identify orphaned objects when looking for memory leaks.
6. Code was added to convert the old vtGNode class objects to the new vtGeometryNode class when reading in VTree models. This is the same thing that is done for vtAGNode's.
7. Added support for disabling extra fx updates when overframes occur on a per fx basis. This was added so that individual fx's that don't interpolate with time can avoid extra updates, such as the bow spray fx in the Mantis Advanced Ocean plug-in.
8. vtDynamicLoader:
   a. Changed alpha on the force render texture block to zero. It was 1.5/255, which was still visible in some cases (sensor, for one).
   b. Added changes to clean up m_TileSceneGraphBranches. Was causing memory leak when changing terrains.
   c. Made various tile tree structures members of the class to prevent needing to reallocate them every calculation.
   d. Added call to remove vtImageBase object from texture when returned to cache, the image data was already being freed, but not the image object itself.
9. Added code to MantisClient and MantisServer to enable low fragmentation heap.
10. Added auto message logging capability in MantisClient to save client and server message logs at a defined interval from 1 to 3600 seconds.
11. Changed the MantisClient message log filename to be consistent with MantisServer message log filename, no more dialog box.
12. Added command line argument to MantisClient and MantisServer to enable/disable low fragmentation heap, the default is currently to be disabled.
13. Swapped the logic of low frag heap command line, use of the low frag heap is now the default and the command line option can be used to disable it.
14. Changed the code to add a glFinish after buffer swap if the swap took less than 0.5 ms, but for now also forced this flag to always be true. This prevents the glFinish from waiting for VSYNC after render but before buffer swap and was artificially causing large render times on sensor channels.
15. Added timeout of 15 to 20 ms to paging thread event wait, this is to allow paging to occur independent of render rate, since paging on sensor channels was falling behind with swap modulo set to 2.

Deficiencies Addressed

1. Fixed RightNow #050324-000004 - Problems changing Year on Mantis Client Environment/Sky tab. Resolution: User input was being regarded as valid even when it was a partial entry (e.g.: "20" while typing in "2005"). Changes added a user input 'flag' to indicate the number was being typed in. This flag then enables a 3 second timeframe after each keystroke where further data can be entered before reverting to the last valid year entry. NOTE: valid year range currently in Mantis is 1970-2038.

2. In the igSynchronized class made some pointers AutoPtr's, objects were being deleted while still a child of an object, resulting in a crash, usually only happened during debugging.
3. Fixed paging indicator on tiled/spanned systems.
4. Fixed stats, paging icon, etc. on tiled systems to account for the tile overlap value.
5. Fixed a bug in which textures downloaded incrementally were not clearing the memory if the transient flag was set, this was causing memory fragmentation when terrain paging was active and a rotorwash fx was enabled.
6. Fixed some issues with switching terrains in conjunction with CFS plug-in and application. Added SendBufferLock to prevent multithreaded corruption between CFS thread and DynLoad thread on servers. RightNow #060501-000003.
7. Removed an extra translate that was causing vtFxExplosion and vtFxFlash effects to not show up on sensor channels. RN# 060606-000005.
8. Fixed a bug where vtImagePMM based textures were not being read when they should have been, causing blocky halos, sun, moon, and other problems in ViXsen.
9. Fixed a bug where fade lod was not being translated into the light point rendering alpha settings properly.
10. Added a check in the texture read callback to make sure PMMs had actually been read from disk. Sometimes they had not, which is bad. RN# 060605-000009.

Detailer:

1. Fixed a bug that could cause Detailer to crash while exiting if warning messages were issued. Now checking pointers on the way down.

Celerity:

1. Added support for DDS source texture for sensor classification. Olson method currently supported only for GCS database. GUI parameter tweakable version follows later. Added support for PMM texture output.
2. Added updates for layered airfield polygons.
3. Fix direction of lights check.
4. Fixed logic errors in Olson classification.
5. Updated dependency logic and processing for LOD 7,8 with Olson method.
6. Added zero byte file check, and option to resample even when some fine tiles missing.
7. Added Fixes and Options for Point Lights ranges.

Rotor Wash plug-in:

1. Making elevation grid values absolute number (double) to minimize smoothing lag anomalies when elevation deltas are used. Sometimes elevation deltas change too quickly for the data smoothing to keep up, such as in the fast-moving invisible rotorwash atatchment entities used in the FARP demo.

Advanced Ocean plug-in:

1. Added call to sync the render state after rendering the ocean, this fixes a VerifyColor() assertion that I was getting in debug mode with the V22 database and Advanced ocean.

2. Vectorized the code that sums the sinusoids for determining wave height so now does 4 at a time. This significantly reduces calculation time. Increased the number of sinusoids from 10 to 12 since it must now be a multiple of 4. This allowed the addition of two extra low frequency sinusoids which significantly improves appearance.
3. Reduced wave heights by 25% to compensate for the additional wave components added a couple of weeks back which made the waves too high.
4. Made OceanHeight() use the current rc->AnimationTime() instead of a stored up time. This is to make it compatible with effects that call the ocean height multiple times per animation frame when there are skipped frames.
5. Fixed problem with wakes being offset to one side of the vessel.
6. Fixed issue with HAT for rotorwash not working correctly since the checkin on 5/8.
7. Made LOS queries work on the ocean.
8. Added Spray effect so that spray appears correct in ViXsen.
9. Fixes to problems with bow spray and wakes when using ViXsen. Previously these would often appear the wrong color.
10. Fixed problem with direction of waves on close up ocean in ViXsen being 180deg out of phase when wind direction is between -45deg and +45deg.

igCigiV2 plug-in:

1. Added the igCigiV2 object as a frame control listener, this had accidently been removed when multiple sync group processing was added. Fixes RightNow incident #060601-000002.

igCigiV3 plug-in:

1. RightNow # 060503-000004 Fix : A CigiHatHotRequest packet asking for an Extended Response will now cause the return of a CigiHatHotExtendedResponse packet. The extended packet contains the HAT, HOT, material code and azimuth/elevation of surface normal. NOTE: A valid response is currently implemented for the Geodetic option of the CigiHatHotRequest. The Entity-relative option is not currently implemented.

IData plug-in:

1. Updated the GUIs and formatting of code.
2. Fixed RightNow incident 060605-000006. Texture state issue was causing the reticle display to be completely red or yellow.

2.2.2 BID 0B6E Notes

Updates/Additions

1. MantisClient/MantisServer: Added command line option: 'enableMessages <0,1>' to enable/disable message logging.
2. Added 1 sec. throttle to error message when failed to write to socket in the UDP com. Channel. This can happen if the connection between MantisClient and the CIGI host is disconnected.

Detailer:

1. RN 050107-000001 recent fix broke bow wake effects. This change prevents loading effects without plug-ins unless it is requested (by Detailer).

Rotor Wash plug-in:

1. Rotorwash memory management fixes. Two main changes :
1. Pre-allocation and recycling of structures to work around the draw thread creating the effects (caused timing spikes).
2. Removal of an earlier TH57 timing optimization that was interfering with the animation time updates (the processing order changed due to that). This addressed a memory leak seen at the IG.
2. Pre-allocating effect structures to work around draw-thread creation of effects and removal of TH57 timing optimization that was apparently in conflict with the earlier AnimationTime() updates made. This last problem was the cause of a memory leak at the IG.
3. Fixed a bug (RN:060428-000007) in Rotorwash that was causing ownship rendering mode to fail when coupled with the shadow plug-in. The alpha write mask enforced by the shadow plug-in was preventing the Rotorwash plug-in from rendering to it's pbuffer successfully. It now pushes and pops the color write mask state around pbuffer rendering.

Volumetric Clouds plug-in:

1. RN: 060328-000009 - Fixed problem where very close small entities would get incorrectly depth buffered when they are inside the cloud layer.

2.2.2 BID 0B6D Notes

Updates/Additions

1. Added option to rotate DOF nodes along with the -X and -Z rotations. Previously, DOFs were not rotated, requiring DOF settings to be applied in the original (OpenFlight) system. Defaults to disable (no rotations) for backwards compatibility with existing SCD and CIGI models.
2. Fixed a problem where a TPF warning was issued for non-paging terrains (which do not require TPF files).
3. Added component controls for table based entity DOFs and switches. This allows one to enable the articulated parts in a model and have them reflected in the shadow geometry when using the ShadowSwitch structure for optimizing ground-clamped shadows.
4. Changed OpenFlight2VTree 'Defaults' to disable replacing group nodes. Group nodes cannot generally be replaced by vtNodes, because the group nodes contain culling information that is lost when replaced by vtNodes.
5. Added monitor refresh period variable to eliminate divide by monitor refresh rate.
6. Changed mission functions for igTerrain object processing messages

7. Narrow FOV Z++ changes:
    a. Modulated the Z++ dividing line distance at narrow FOVs.
    b. Extended Z++ to be controllable on a per-sync group basis.
    c. Updated CIGI 2.0 component controls with a sync group field.

Deficiencies Addressed

1. RightNow Incident: 060429-000001. Fixed a symptom where Mantis would intermittently hang waiting for the database to come ready and the CFS application and would never completely initialize prior to last server reporting discovery information.
2. RightNow Incident: 060419-000004. Fixed a bug where the E/W and N/S selectors on the Stealth stored waypoint area did not cause a change in hemisphere. See
3. RightNow Incident 060412-000007: Fixes to allow halos to be rendered when the light point is beyond the far clip plane. Of course this requires that the light point not have an LOD structure that turns it off at these large distances.
4. RightNow Incident 060320-000007: UDP socket can now handle datagrams larger than 8192 bytes.
5. RigthNow Incidents 050210-000005 and 050318-000004. Added client side status information on terrain loading.
6. Fixed a problem that can result in a crash on MantisClient start-up.
7. Updated GUI and registry behavior for the new "Rotate DOFs" option to OpenFlightTovTree.
8. Fixed a problem in OpenFlight2VTree relating to vt_table_entry comments in DOF, switch, and animation nodes.
9. Fixed problem that resulted in unpredictable results if foglights were added with indices in random order. For example adding Entity fog lights with indices = 0, 1, 2, ... operated as expected, but adding fog lights with index = 3, 5, 1 did not operate as expected.
10. RightNow Incident 060420-000001. Fixed a crash found during a hyperjump. Added code to reset igModelBase objects before being added back to the model cache.
11. Added logic for determining if Special Effects need to be updated for the certain animation times, fixes problems on tiled IDX systems for particles which integrate time.
12. Statistic enhancements switched order of data clean and mission function columns now that their column order can be controlled via creation order.

Detailer:

1. Made the DOF axis window larger so that you do not have to scroll when setting the axis.
2. Changed default model DOF axes to match the CIGI entity coordinate system, as long as the model is in the Mantis/VTree coordinate system.
3. RightNow Incident: 050107-000001: Detailer erases effects if the plug-in is not loaded. This change adds support for updating effects when a plug-in is loaded after the SCD file is opened.

4. RightNow #050107-000001: Detailer erases effects if plug-in is not loaded.

Rotor Wash plug-in:

1. Elimination of tiling anomalies: Changed internal Rotorwash Constants to optimize rendering and mission function math to eliminate tiling anomalies. Improved calculations for geocentric databases. Improved data synchronization across rendering channels and rendering servers.
2. Ocean correlation bug fixes.

DiGuy plug-in:

1. Improved data synchronization for scenario updates, helping to eliminate glitches and tiling artifacts.

Known Issues

1. Occasionally after extended runs (greater than 3 hours) the Mantis Server can crash. This has been noticed consistently with Vixsen NVG channels after approximately 3 hours.
2. AGC is operational, but causes some intrusions in the CIGI thread, thus causing frame drops when AGC is active. Evidence of this occurring is Mantis Client messages that the SOF received from the host was late . The work around is to disable AGC.
3. Since Vixsen is writing data to the ATM and Material Caches in the Mantis folder, it is not possible to run a ViXsen application as a local user on CSA systems. The work around to this problem is to run Sensor Missions as Administrator or change permissions during install or after install. On images received from Quantum3D this problem should be addressed in future releases of IG Platform.
4. Occasionally it has been noticed that enabling/disabling shadows on certain entities causes other entity shadows to enable/disable (not the desired entity). The work around to this problem is to make all entity ground clamping shadows enabled or disabled simultaneously (this is usually the desired effect).
5. Successive database changes between morphing and non-morphing databases have resulted in Mantis hanging and not responding to host communications and changes. The work around to this problem is to restart using an MPF specifically for the desired database.
6. Quest channels will jitter and be unsynchronized until Mantis Servers completely initialize nVsync.
7. Sometimes the Mantis out the windows channels will have a gap or synchronization problem during initialization. Mantis nVsync/ESync initialization will fix the problem before the simulation is fully started.
8. Enabling Quiet Message with High CIGI verbosity yields the Mantis Client very un responsive. The work around is enable this for a very short period of time specifically to generate debug messages and not tries complex GUI interaction during this time.

2.2.1 BID 0B5B Notes

Updates/Additions

1. Added Narrow FOV support, per-sync group control of:
   a. Paging center offset
   b. Paging terrain LOD scale
   c. Paging terrain texture MIP bias
   d. Model LOD scale.
2. Updates to narrow FOV:
   a. Model LOD scale factor now scales .vt terrains, external references and inline culture on paging terrains.
   b. Model LOD scale label in GUI changed to just plain old "LOD Scale".
   c. LOD scaling is not an actual LOD scale on the GUI, not a switch range scale. This means that now to get more detail, enter a number LT 1.0 for the scale factor.
   d. Changed Paging LOD Scale label to read "Paging Range Scaling", since this is actually what's being done.
3. Added some default nVSync initialization code to MantisClient.
4. Made ".txt" the default message MantisServer log file type. Note: still have to enter the ".txt" when typing the name for some reason.
5. RightNow Incident 060124-000004: Added more accurate algorithm for calculating moon Azimuth and Altitude. Should now be accurate within 0.1 degrees.
6. Now displaying an error if a Python script cannot be parsed. Was only returning FALSE. The error message includes the line and column of the parsing error and the offending text.
7. Updated texture memory usage calculation, some textures were not being counted properly.

Deficiencies Addressed

1. Fixed a bug where the stealth "Save" waypoint button would seem to update the GUI but a subsequent "Apply" waypoint would not jump to the position on the GUI.
2. Fixed a problem with nVSync initialization that unintentionally added unassigned MantisServers to swap domain 0 and potentially resulted in 1 Hz rendering if swap domain 0 was used.
3. Fixed a problem with models such as IFLOLS not working properly on geocentric terrains, added the "pyTransformPoint" function, which is a callback for the vtAPI Python function "TransformPoint". The function transforms a double precision 3-vector from one coordinate system to another.
4. Fixed a bug where DOF (articulated part) operation order was not being preserved in the SCD file.
5. Fixed "forced texture downsampling" – at least in DDS textures.

6. RightNow Incident 051208-000000: NVIS Light precision and occulting. Disabled alpha testing whilst halo visibility checks are performed since this was causing halos to flicker.
7. Fixed a bug in vtDynamicLoader causing frame drops when paging sensor textures (especially when compressing on the fly). Material-mapped textures are now processed in the QueueTextureForPaging method, so that the processing occurs in the background (calling) thread.

Detailer:
1. Fixed a bug where Detailer would not produce an error message when trying to embed/un-embed scripts from a read-only VTree file. Added a new feature to pop-up the message box if a warning or fatal error is added.
2. Fixed crash on exit problem.
3. Fixed a bug where the renderer was not applying DOF operations in the prescribed order.
4. Now detecting and displaying errors when adding a script to a model.

OpenFlight2VTree:
1. Added a moving model and airfield defaults to Oflt2Vt. There are 2 buttons on the gui There is also 2 new arguments to the command line (-mm and -af). These will set the defaults and can be overridden by passing additional arguments.

TreeBuilder:
1. Removed wind and projected shadow options from GUI.
2. Added cull distance option to GUI to speed up rendering when there are lots of trees.
3. Significant performance improvements when dealing with large numbers of trees.
4. Changed default placement option to random.
5. Changed default placement density to 0.001.

Mantis Plug-ins

1. igCigiV2/igCigiV3:
   - Fixed a bug where CIGI articulated part control angles and offsets were being "swizzled" before application. This may require SCD changes to existing (older) SCD files to get the same affects as before this change.
   - Fixed the CIGI "Rate Control" packet to NOT swizzle the coordinates, as per the recent change to articulated parts (DOFS).
   - Fixed bug in SwapReady() preSwapMask processing that would keep hardware sync enabled for a sync group, even if disabled.
   - Added support for tracking pre and post swap counts on per swap domain basis, recorded in stats 7.x logs.

2. AdvancedOcean/StdOcean:
   - In Detailer fixed crashing problem when hardware is insufficient to support boat wakes.

3. SpeedTree:
   - Added Fade distance option for trees.
   - Added Scale LODs by tree size option.
   - Improved culling performance for large numbers of trees.
   - Added random factor to fade range for each tree to soften the fade in of trees.
   - Removed geometry from Speedtree entity as this was wasting memory and increasing processing time.
   - Switched to using a vertex array for rendering billboards and shadows (previously used immediate mode).
   - Fixed projected shadows so they now work as intended.
   - Greatly speeded tree loading for large numbers of trees.
   - Significantly reduced the runtime memory footprint of each tree instance.
   - Fixed slight error in cull sphere calculation for each tree.
   - Added support for .tbt file which lists multiple .tbd files to be loaded and merged.
   - Switched billboard and shadow vertex arrays to use VBO's.
   - Switched to using two entities - on that culls down to the individual tree level used for generating list of visible 3D trees. The other culls down to groups of 100 or less trees used for generating list of visible billboards.
   - These two changes resulted in almost doubling the processing speed - particularly when there are lots of billboards and only a few 3D trees.
   - Now pre-compute geometry for billboards at LOD level 0.
   - Modified to keep all VBO's seperate rather than munging them all into one big VBO. This is to allow interleaving of updating one VBO whilst rendering from another.
   - Also dropped support for vertex array range since I don't envision us ever needing it.
   - Fixed problem with wind part of GUI not being displayed.
   - Fixed problem with projected shadows getting incorrectly culled.
   - Fixed problem with illumination flickering.
   - Fixed to work with shadow map shadow methods.
   - Fixed issue with leaf billboards not always facing viewer.
   - Made compatible with the notion of not rendering the vertical billboard for steep view angles.
   - Added SSE instructions for generating billboards.
   - Added filter to Tree Builder file browser (looks for .tbd and .tbt files).
   - Fixed problem with plug-in still doing lots of processing when not enabled.
   - Changed to force use of .spt files default rand seed when using instances. This ensures a smoother billboard to 3D transition when using 360 deg billboards.
   - Further performance improvements for rendering bill boards. Now interleave VBO's for the billboards and shadows so that once a certain number of billboards (or shadows) have been computed they are submitted to the GPU for rendering then the CPU continues onto the next batch.

4. RotorWash:
   - Fixed a conflict with DiGuy which caused the figures to disembody, the matrix mode was being set to projection and not restored to model view.

5. DiGuy/DiGuy6:
   - Fix for DIGuys getting out of sync after a CIGI reset.
   - Set the scenario and character time out to 1 billion. Default was 60,000.

2.2.0 BID 0B49 Notes

Updates/Additions

1. Added new render statistics and additional draw call statistics in statistics level 3.
2. Updated the statistics level controls to include descriptive strings.
3. Added waypoints to the MantisClient Stealth tab, saved to the MPF file.
4. Added data re-sync capability for syncing data in multiple sync groups, enabled using MANTIS_ENABLE_SESSION_RESYNC set to 1 on MantisClient computer, default is currently disabled.
5. Added flag for extrapolation that indicates if a RateControl packet has ever been applied to a model.
6. Added stats: NumPagingOperationsInLastList (the number of pending paging operations), CurrentPagingOperation (usually 0 since the list is recalculated often), and DrawCalls (counting glDraw*() calls)
7. Added new time capabilities: PreDownload (before downloading texture and VBO) and PreFinish (before the glFinish() call).
8. Renamed some existing stats in stats level 3 to be more self explanatory and prevented dynamic VBO stats from displaying if they were 0.
9. Support for nVidia Cg v1.4.
10. Changed the hysteresis coefficients used for paging terrains to be 0 0 50.
11. Increased maximum number of open files from 512 to 2048.

Deficiencies Addressed

1. RightNow Incident 060123-000003: Fixed a problem that performance is degraded after the IG sits idle for a period of time. “Coming back to" an ASNode that was running before being, for example, culled, caused a large frame hit as time "caught up".
2. Fixed problem with wind direction being incorrect for the texture method precipitation when in geocentric mode.
3. Fixed bug when counting geometry node polygons.

Mantis Plug-ins

1. igCigiV2/igCigiV3:
   - Added CIGI Asynchronous Extrapolation.
   - Fixed RightNow 060112-000001 : Hold Time not working from UTF.

2. AdvancedOcean:
   - Fixed a render order issue between the ocean and the terrain, showed up as a problem on trees with alpha.
   - Fixed disrepency in the wind direction which was 90 degreed out.

3. Shadow:
   - Disabled object culling while rendering shadow geometry, this fixes a problem for missing parts in shadows for models, biggest reason is incorrect group node bounding information, but this way all geometry is rendered for shadows.

4. VolumetricClouds:
   - Added support for bicubic filtering when copying the clouds to the frame buffer.
   - Fix for problems when using cloud shadows with no weather pattern texture.
   - Fixed problem with wind and weather directions being inconsistent with the rest of Mantis, they were 90 degrees out.

2.2.0 BID 0B32 Notes

Updates/Additions

1. Added CIGI control of vtASNode repeat count for model animations.
2. Misc. ScramNet updates, mostly cleanup, polling fixes.
3. Changes to speed up shader effects by doing late binding of the shader so a shader doesn't get bound to the GPU unless it is about to be used for rendering with.
4. Modified built in effects to always have a detailed texture - if the base texture does not have a detail texture then a default white texture is used. Cuts down on how many times the shader must be changed.

Deficiencies Addressed

1. Fixed a bug where attaching a view to a clamped model would cause viewpoint jitter. The fix was to move the isector updating after model updating and before view updating. Unfortunately, this messed up stats timing, which will need to be repaired now.
2. Fix for the model jitter problem when dead reckoning and clamping are both enabled.
3. Fixed problems with near clip override being enabled: lightpoints rendered on cockpit geometry and ownship shadows disappearing.
4. Fixed altitude bias problem when clamping models to LCC terrain.
5. Bug fix for the morphing shader not using the dominant light source. Because having one shader that can index the light information dynamically is a performance hit, this solution loads one shader per light source.

Mantis Plug-ins

1. igCigiV2:
   - Modified packet enable locking so that the packet enables are not locked for extended periods of time, this is an effort to fix the MantisClient GUI from locking up when packets are enabled/disabled while running, delete usleep() method, format changes.
   - Added new component controls for real-time control of vtASNodes (animations). They are entity controls with componentIDs from 315-319.
   - Updated the ViewDefinition processing so that FOV angles can be sent piecewise in separate packets.
   - Added IsPacketEnabled() method that is called before NotifyPlugins(), this fixes problem where disabled packets are still processed by plug-ins, removed some glitch macro code, fixed some warnings.
   - Fixed some problems with stats level 7 logging on client side.

2. igCigiV3:
   - Modified packet enable locking so that the packet enables are not locked for extended periods of time, this is an effort to fix the MantisClient GUI from locking up when packets are enabled/disabled while running, delete usleep() method, format changes.
   - Added new component controls for real-time control of vtASNodes (animations). They are entity controls with componentIDs from 315-319.
   - Updated the ViewDefinition processing so that FOV angles can be sent piecewise in separate packets.
   - Added IsPacketEnabled() method that is called before NotifyPlugins(), this fixes problem where disabled packets are still processed by plug-ins, removed some glitch macro code, fixed some warnings.
   - Fixed some problems with stats level 7 logging on client side.
   - Fixed a bug where CIGI packet handlers were not being installed if the plug-in was not yet initialized. The change is to save them for application after initialization.
   - Fixed LCC Clamp Bias error.
   - Enabled CIGI big-endian byte-swapping for CIGI3 processing.

3. igQuest:
   - Fixed a bug that was causing an infinite loop when a CIGI packet with class=sensor was received. The iterator was not being incremented properly.

4. ColorTuner:
   - Fixed a bug that could cause MantisClient to crash on Independence. The VTree file materials list was read without having a valid and active OpenGL rendering context.

5. igIGM:
   - Changed to use channel IDs instead of display names.

- Removed dependency on Q3D Quad, now using fmStrings instead.

6. Shadow:
   - Added support for Hierarchical shadow mapping.
   - Fixed problem with ShadowSwitch not working for vtFadeEntities.

7. AdvancedOcean:
   - Fixed problems with occasional crashes when reflections are enabled and shadows or cloud shadows are turned on or off.
   - Fixed problem intriduced by recent optimisation for Z++ which was causing the close up ocean to appear in correct.
   - Fixed recently introduced bug which broke 3D ocean on tiled systems.
   - Fixed bug in macro creation for spotlight versions of ocean.
   - Fixed problem with ocean shader sometimes randomly not compiling or not being loadable.

2.2.0 BID 0B26 Notes

Deficiencies Addressed

1. Added SyncToRenderContext() method to vtRSState so that the render state could be sync'd to the render context prior to calling VisitAllNodes(), this fixes a problem seen in the Apache database where RSNode processing restored the render context incorrectly based on an out of sync render state.

Mantis Plug-ins

1. igCigiV2/igCigiV3:
   - Fixed crash that occurred when applying UDP port/host changes while running.
   - Fixed bug with setting VSYNC time in the WaitForSendTimeVSync() method, this affected data synchronization when using the serial cable to sync the client and servers.

2.2.0 BID 0B21 Notes

Updates/additions

1. Added SCRAMNet support to CIGI plug-ins.
2. In nVSync class: modified WaitForFrameInterrupt() to include an event time and retry logic, updated GetSDGuardBandPreSwapMargin() to work with new nVSync DLLs with enhanced sync support, added frame interrupt test.
3. Modified memory locking code so that the working set size is not reduced unnecessarily, causing unloading and subsequent reloading/locking of memory. This only happened if the memory was relocked forcibly after initial startup.

4. Added flag to igModel class to accommodate CIGI EntityControl clamping that overrides SCD file clamping attributes.
5. No longer create a bin for the bottom of the cloud layer. This is to ensure the ground fog is always rendered in the same bin as the terrain which is required in order for the light points to sort with the ground fog correctly.

Deficiencies Addressed

1. Fixed crash bug during shutdown accessing frame controls that had already been deleted.
2. Fixed bug which causes the channel name edit box to remain disabled.
3. Fixes to make light points sort correctly with ground fog produced by GroundFogPlugin.
4. Fixed problem with halos getting depth buffered at very close ranges.

Mantis Plug-ins

1. ColorTuner:
   - Fixed a bug where repeated materials cause models, other than the first, to not to be added to the list.
   - Fixed a bug where models removed from the SCD file would not be removed from the ColorTuning models list. Also fixed a related bug where removing the SCD file from the configuration would not remove ColorTuning models

2. GroundFog:
   - Modifications to fix sorting with light points.

3. igCigiV2:
   - Added SCRAMNet support.
   - Factored SyncData() into several methods to simplify support.
   - Added several methodologies to sync cigi client thread to VSYNC: frame interrupt #1, wake on VSYNC (don't use), WaitUntil() (spin loop) or nothing. Sync on interrupt #1 is default if client is nVSync master, sync using WaitUntil() is default otherwise.
   - Fixed some problems with async operation.
   - Fixed a bug when CIGI playback is paused, msgTime was not being updated, this caused problems when checking receive time in conjunction with strict data processing.
   - Fixed startup problem if sync to VSYNC (serial sync cable) is enabled in the CIGI plug-in, the logic didn't think anything had changed so aborted the processing.

4. igCigiV3:
   - Added SCRAMNet support.
   - Factored SyncData() into several methods to simplify support.

- Added several methodologies to sync cigi client thread to VSYNC: frame interrupt #1, wake on VSYNC (don't use), WaitUntil() (spin loop) or nothing. Sync on interrupt #1 is default if client is nVSync master, sync using WaitUntil() is default otherwise.
- Fixed some problems with async operation.
- Fixed a bug when CIGI playback is paused, msgTime was not being updated, this caused problems when checking receive time in conjunction with strict data processing.
- Fixed startup problem if sync to VSYNC (serial sync cable) is enabled in the CIGI plug-in, the logic didn't think anything had changed so aborted the processing.
- Added CIGI 3.1 support for: ShortArticulatedPart, ConformalClampedEntityControl, and EntityControl specified clamping.

5. StandardOcean:
   - Renamed GUI tab to 'StdOcean'.

6. AdvancedOcean:
   - Renamed GUI tab to 'AdvOcean'.
   - Fixed problem with ocean being at twice the desired sea level when in geocentric mode.
   - Improved performance when z++ is enabled by not rendering the ocean if the viewpoint is higher above the ocean than the viewport Yon range.
   - Modified shader to distort ocean in the distance to try and hide tiling.
   - Added support for cloud shadows.
   - Fixed some crashing issues when enabling/disabling reflections and shadows.
   - Switched to using intensity textures for environment map instead of rgb to improve performance.
   - Switched some textures to use LinearMipmapNearest instead of LinearMipmapLinear filtering to improve performance.
   - Further improvements to randomness of ocean at range.
   - Removed some harsh noise transitions so it works better for distorting distant ocean.

2.2.0 BID 0B10 Notes

Updates/additions

1. In the MantissServer memory locking class, added Reset() method and increased the minimum working size by 25% (this fixed the problem of not being able to lock some process memory).
2. Added GroundFogRenderOrder.
3. Added ground fog methods.

Deficiencies Addressed

1. Fixed MantisClient Channels/Parms GUI bug in which the general hardware enables were being disabled if software frame sync was modified, these controls should be independent of software frame sync.
2. Bug fix for MantisClient when switching .mpf files, caused MantisClient to crash or disappear.
3. Fixed bug in MNP loader which flagged all paging geometry as terrain, this broke the ocean plug-ins which look at the flag to know if the geometry is 3D ocean.

2.2.0 Notes

Updates/additions

1. Added support for multiple sync groups and enhanced nVSync.
2. Removed thread priority modification for com channels in general.
3. Added ColorTuner plug-in project.
4. Modified VTree DLL/librarie to embed lightpoint shader effect files.
5. Modified shader light points to accumulate into the scene rather than blend. This prevents dim light points from appearing as dark spots, it also eliminates priority issues with render order of different colored points. Also improved ViXsen compatibilitty - when ViXsen is used an intensity is calculated for the point instead of a color.
6. Embedded morphing terrain shaders into VTree.
7. Modifications to allow .pmm textures to be embedded.
8. RightNow Incident 051208-000000: Modified halo occlusion query to render a 3 pixel diameter light point and then determine the proportion of it that is visible. The halo is then attenuated according to the visibility. This makes halos fade nicely as they become occluded and also reduces flickering problems due to aliasing and z-fighting with objects close to the light point.
9. Added quiet debug messages when textures get downloaded non-incrementally. Fixed texture bytes downloaded numbers, and download throttling.
10. vtDynamicLoader: Improved MNP tile info by read efficiency by reading a large chunk of memory from disk and parsing it out. Somewhat tested with NVG sensors. There is currently a QUIET message for every disk read operation which could be removed if it gets annoying.

Deficiencies Addressed

1. Fixed problem with light point glow when there is more than one type of light rendered (omnidirectional, bidirectional or uni-directional).

Mantis Apps

1. CacheFileServerApp:
   - Added memclr of blocks when they are allocated.

- Preallocated file block lists.
- Provided access to memory usage to support preallocation of file block lists

Mantis Plug-ins

1. CacheFileServer:
   - Added memclr of blocks when they are allocated.
   - Preallocated file block lists.
   - Provided access to memory usage to support preallocation of file block lists

2. igCigiV3:
   - Fixed issue where Rate was not getting assigned if the ArticulatedPartId was set to -1.

3. AdvancedOcean:
   - Performance enhancements:
     - Added Ripple Blur parameter to allow adjustment of the texture LOD bias for the ripple texture.
     - Now switch between two different shaders depending on altitude. At low altitudes two ripple textures are combined, at higher altitudes only one ripple texture is accessed.
     - Now only do render to PBuffer pass once per frame when Z++ is enabled (previously it was done twice)

2.1.0 Notes

Updates/additions

1. Added a system wide light point arc-length minimum setting which scales the min, max, and fade pixels sizes on all channels. This setting basically makes every channel use the given arc-length as the size of a pixel for purposes of determining light point sizes.
2. Changed vtImageBase to use a vtMemoryBuffer as it's data buffer, instead of a raw char array.
3. Added a cache of vtMemoryBuffers to the dynamic loader, with 10 1MB buffers in the cache, resulting in 100% cache hit rates so far in testing.
4. Replaced STL object member clear() in several places with resize(0).
5. Efficiency improvement in igMsg caching that should reduce memory allocations.
6. Added multi-archive capability to DynamicLoader.
7. Added attenuation to moon glow as the moon climbs higher in the sky (as per JSF SME suggestion).
8. Added compressed texture subloading.
9. Added support for TexGen intrinsic parameters.
10. Improvements to OpenFlight conversion process, including vtGNodeBuilder, vtImageDDS, and other VTree files. Issues fixed come mainly from RightNow incidents (esp. NADS). Also added vtIndex.h to VTree project.
11. Added check to disable any shader (even just a vertex shader) when light point glow is enabled. This is because vertex shaders for point sprites don't work the same as vertex shaders for regular light points and you end up with weird effects happening. This means morphing light points will not morph when LPG is enabled.
12. Added support for shadows with morphing terrain.
13. Added a means to disable automatic MIP-map generation by adding a second parameter to vtRenderContext::GenerateMipmaps that can be TRUE (default) or FALSE.
14. Added support for cloud shadows.
15. Optimization changes to meshing, now using STL collections and more to address NADS conversion speed issues.
16. Modified to provide support for up to three spotlights when using the built in shaders as long as bump mapping is not used, cloud shadows are not enabled and trapezoidal shadow mapping is not being used.
17. Modified built-in-effects Omni-Lights and Spotlight intensity calculations to be done in view space rather than world space. This fixes some issues on large area DB's.
18. Increased cloud coverage slightly when generating shadows to compensate for shadows appearing too small.
19. Modified cloud shadows so that they don't get cast on entities that are above the cloud layer.
20. Fixed a bug in paging database loader in which materials for external reference models were not getting defined.
21. Added VBO creation so that stars use VBO.

22. Added ability to flag spotlights as shadow casters.
23. Removed extra glFinish call after swap.
24. Added dump of spotlight shadow caster enable control for CIGI20 component control.
25. Added a new render stat for shader state changes. It could be improved to differentiate vertex program and fragment shader state changes.
26. Added shader state changes to stats level 3.

Deficiencies Addressed

1. Fixed problem with Ocean not rendering properly on certain databases. It was a timing problem, so a query interface was added to dynamic loader to handle tile paged events.
2. Fixed a GUI bug when switching databases. Problem had to do with terrain indexes being one-based in CIGI.
3. Fixed bug in calculation of range of reference position for culture on morphing terrain.
4. Fixed a bug that was causing the texture manager to select 3D texture targets due to a Fixed two bugs. (1) writing DDS images to disk now works with MIP-maps, (2) incremental downloading now works for MIP-images of dimension less than four.
5. parameter mismatch.
6. Fixes to make Light Point Glow work with shader based lights and morphing terrain.
7. Fixed problem with the tex coords sometimes being NAN's when the built in shaders are used for non-textured polys.
8. Fixed problem with using world space shadow receiver pos.
9. Fixed cloud shadows to work in geocentric mode.
10. Fixed problem with black polygons when only one omni light is enabled.
11. Fixed VBO bytes downloaded stats.
12. Fixed a bug where non-embedded sensor textures were not being downloaded with the recently added incremental download code if the texture image had not previously been read from disk.
13. Changed vtFile member to a pointer so it is only allocated when needed. The member is not normally needed, but takes a long time to instantiate. This was causing glitches during database paging.
14. Memory leak fixes to PMM image processing.
15. Fixed a bug where shader state changes were not being correctly updated in all cases.
16. Modified to allow any number of cloud slices on low LOD rather than just powers of 2.
17. Removed a terrible memory allocation/free call that would get triggered in just about every read call made to Reliable UDP com channels. This was causing glitches when running with the CFS plug-in and app.

Mantis Apps

1. CachedFileServerApp:
    - Added debug functionality (when the "MANTIS_DEBUG_CFS" environment variable is present. A button appears on the client GUI and that allows the cache to be cleared.

2. Detailer:
    - Added a "Tools" menu with a "Performance Report" entry to generate a text performance reporting showing texture and VBO usage for the entire SCD file.

3. ViXsenMatSysEdit:
    - Fixed so that ImageMapper lib info is reloaded after ImageMapper libraries are modified.

Mantis Plug-ins

1. Shadow:
    - Added an enable for "strict clamping" which will allow forcing "closest terminate" conditions on ground polygon clamping isectors. The default is for this enable to be off, allowing fast cached isector tests.
    - Made the shadow switch name lookup a case insensitive test.
    - Made the ground clamped polygon shadow method use the bounding sphere of just the shadow geometry path when determining how to render into the shadow texture, what size the ground polygon should be, etc.

2. Volumetric Clouds:
    - Added support for cloud shadows.
    - Added cloud thickness to vtViewport to support CloudShadows.
    - Fixed problem with detail texture on terrain sometimes getting screwed up when eyepoint is inside the cloud layer.
    - Fixed problem with light source being in the wrong direction when in geocentric mode.
    - Fixed backlighting so it works in geocentric mode.
    - Fixed cloud shadows to work in geocentric mode.

3. igCigiV2/igCigiV3:
    - Added initial support for asynchronous operation. Still being tested.

4. Advanced Ocean:
    - Made lighting calculation for whitecaps not depend upon angle between water surface and sun. This stops whitecaps from getting too dark early morning and evening. Due to the rough bubbly surface structure this lighting modification is fairly valid.

- Modified spotlight mixing calculation from an addition to a max operation. This was because the addition method produced an overbright intenisty where spotlights overlap.
- Fixed a problem with wakes not working and causing severe performance penalty when z++ enabled.
- Fixed lighting calculation of wake so that it is not dependent upon view direction.
- Added dependent texture read to wake texture to add animation to the wakes.

5. RotorWash:
   - Water ring effect updates plus some geocentric fixes.
   - vtPbuffer updates. The original rotorwash Pbuffer implementation has now been removed.

2.0.1 Notes

Updates/additions

1. Added informational message when a revised texture or vbo cache is available, this is to notify the user to properly stop Mantis so that the revised cch file is written, may also coincide with render glitches.
2. Improved memory locking messages in MantisServer if quiet messages are disabled.
3. Moved the forced texture downloads to happen in the lower left corner even if IDX tiling is active, this prevents the textured polygon from being culled.

Deficiencies Addressed

1. Fixed a bug with "find highest" intersection tests that would cause cached-triangle hits to actually miss.
2. Bug fix for pushing switch in ranges out. Have to wait until the tile sizes are recalculated.
3. Fixed a bug that could cause a memory leak in the MNP loader if paging is disabled.
4. Fixed stencil render bug when rendering forced textures over ocean. A square in the ocean would be visible when textures were downloaded.
5. Bug fix for cracks in a paging database, the previously calculated correct database origin was being overwritten with incorrect data from the database.
6. Bug fix for culture with LOD nodes not appearing correctly on tiles in paging database. These nodes needed autoupdate set to TRUE.
7. Removed optimization for minimizing binding and unbinding of built in effects because it was causing some bad side effects, such as when models have different shading like Phong and Gouraud. This also fixed a render performance problem when shadows crossed tile boundaries on large channel IDX systems.
8. Made change so that .vt terrains are named and marked as a terrain.
9. Fixed model scaling problem for models with children.

Mantis Plug-ins

1. IData plug-in:
   - Added SetServer() and OnDeleteFromServer() methods, mainly so that this plug-in becomes a child of the graphics server and updates at the frame rate.

2. igStats:
   - Added property list support so that settings can be saved from run to run.

3. Shadow:
   - Fixed problem with position method always getting saved as View Space Mode in .mpf file.

4. Volumetric Clouds:
   - Fixed bug whereby skirt was getting rendered at z++ transition range when z++ enabled.

2.0.0 Notes

Updates/additions

1. Added support for automatically loading .tpf files when a terrain is loaded, either at startup or selected during runtime.
2. Now using mirrored texture clamping to cut down on spotlight memory usage, and pre-defining 100 textures for 1-100% spotlight power levels. If the extension is not supported, then full textures are used at 4% steps. Change is transparent to end-users.
3. Added CFS channel support to the Mantis MNP plug-in.
4. New terrain paging algorithm!
5. Added offset paging center support to MNP loader.
6. Added memory locking to MantisServer, activated with the "-lockMemory <0/1>" command-line switch. Default is OFF.
7. Added ClearPlanesBit check to determine if the viewport should be erased if the channel rendering is disabled, this allows plug-ins like IDataPlugin to take control of clearing the frame buffer on disabled channels (plug-in can draw background).
8. Doubled the minimum pixel size of lightpoints rendered with the fixed function pipeline to match the 2 pixel minimum size used in the lightpoint shader. This allows the lightpoints rendered in ViXsen to appear the same same as the visual scene lightpoints.

Deficiencies Addressed

1. Fixed a bug that caused entries in the terrain list to be deleted if switching terrains from the GUI during runtime.
2. Modified CFS memory allocation for bands (channels) to be "on demand". This is to address a memory resource utilization issue reported by James Manning, Ronnie, and others.
3. Modified the CreateRemote()/ModifyRemote() processing to send a single broadcast message to relevant sessions instead of message to each session. Was causing render glitches when remote objects were created on large channel systems. Can be disabled by undefining USE_NEW_CREATE_REMOTE_MESSAGING in igSynchronized.cpp.
4. Changed the vtFile locking to be dependent on the paging database to be ready or not, instead of using the data sync enable, this was preventing databases from switching in a timely manner during runtime.
5. Fixed a bug with the .cch processing, if the last line contains a valid data entry but does not end with a CR/LF, then the entry was ignored.
6. Fixed Mantis SDK InstallShield, some header files were missing and/or located in the wrong place.

7. Fixed bug in CFS processing where channel 0 was used for sensor channels when freeing blocks.
8. Fixed a crash, an IGM query object was being uninitialized before it should have been.
9. Various updates to the terrain .tpf file selection:
    - Morph dialog file edit box reflects terrain selected in list
    - LOD list cleared if .tpf file does not exist
    - Tpf file save dialog is now a "Save As" dialog instead of an "Open" dialog
    - Selecting Content/Terrain tab does not cause .tpf file of currently selected terrain to be used since the actual terrain may have been selected via CIGI and different than the GUI selection.
10. Fix to use light point actual sizes instead of point sizes in shader based rendering.
11. Fixed a problem when querying role type information from IGM.
12. Added handling of (short) component controls 301 through 304 (shadows, etc.) [cut & pasted from CigiV2 plug-in code]
13. Fixed issue with spotlights being almost black when using built in effects. Problem introduced a couple of weeks ago with Tim’s variable attenuation spotlight modifications.
14. Bug fix to MNP tile extents not being calculated correctly.
15. Fix for missing external references in paging terrains.
16. Fix incorrect length of LOD extents vector after redefining the database (switching databases for example).
17. Improved diagnostics for CFS debugging.
18. Modified the CFS plug-in configuration handling to be set immediately, instead of sync’d from server thread.
19. Scene graph generated in MNP loader restructured to be hierarchical again, and include embedded culture.
20. Fixed crash that could occur if a geometry node was reporting morphing info, but didn't have any.
21. Forced UseLODRangeTable to always be true, user cannot override.
22. Bug fixes to CFS plug-in and app to eliminate stalled database loads and missing LOD data.
23. Fixed bug where lightpoint glow wouldn't work if a plug-in installed a new viewport 0, like Shadow plug-in.
24. Fixed floating-point roundoff problem and segment stretching for collision segment processing in geocentric mode.
25. Fixed color state getting out of sync during texture force download.
26. Fixed a bug in the MantisClient product license decode that indicated there were valid ViXsenXXX servers even if the ViXsen or ViXsen16 subproduct wasn't licensed.
27. Fixed issues with isector caches not get invalidated when tiles are switched off or terrains are switched. This was causing problems with shadows not staying clamped after a database switch.
28. In MNP loader moved the point parameter setup code into ForceBlockTextureDisplay() so that it is only called if there are textures to download.

29. Bug fix for paging databases that have half tiles on the south or west side, having incorrect paging centers that end up paging in far away from the eyepoint.
30. Fixed a particle system restart problem, current particles could be orphaned.
31. Fixed a crash bug occurring in vtDynLoadEntity::QueryGeo(), made the node pointers in the memento class autopointers so that the node isn't deleted during isector processing.
32. Fixed a crash due to unprotected pointer in lightpoint processing on morphing terrains.
33. Fixed a random crash that occurred after toggling polygonal shadows on and off multiple times, the viewport was not getting removed from the parent window.
34. Added code to update the viewport culling info in tiled mode on IDX if the number of viewports changes, such as when the Shadow plug-in in Mantis adds or removes it’s viewport for polygonal shadows.
35. Moved the terrain extend and morphing range update processing from the server thread to the graphics thread.
36. Fixed a problem with the offset paging center code in the MNP loader, after hyperjumping or stealthing fast it was causing unnecessary paging to occur.
37. Fix for intersection tests that are cached not properly invalidating as the terrain morphs (as the eye point moves).
38. Bug fix for incorrect morphing ranges being applied to "finest" lods.
39. Bug fix for not being able to page in small databases.
40. Fixed model to eye problem when rendering flame, flash and explosion fx in sensor mode. For certain aspect angles the fx would not be rendered.
41. Added back in texture updating even when not paging, so vixsen processing works.
42. Fixed crash that occurred if the parent of a model part was deleted and the model part still had pointers to the parent DOF or Switch node.
43. Fix in morph dialog to parsing of tile radii from .mnp files, and adjusting switch in ranges appropriately.
44. Fixed a depth problem rendering halos with Z++ enabled, modified the depth test function to only consider lightpoints within the current hither and yon limits.
45. Modified the lightpoint rendering in VTree to use point parameters (fast path) even if ViXsen is active but only if halos are disabled.
46. Fix in morph dialog so that switch-In ranges loaded in .tpf files are now pushed out to ensure 1 LOD difference between neighbors.
47. Fixed a problem with VLOS attachment to children of entities.

Mantis Plug-ins

1. igCigiV2:
    - Added pointer check against NULL in collision segment processing. This was causing a crash if models were changed while a collision was taking place.
    - Added check to the client thread for strict data processing enable when processing the sentinel record, so if strict data processing is disabled, then the current data is processed and data sync is performed, even if the message count is wrong

2. igCigiV3:
    - Fixed some view control processing problems, degrees vs. radians.
    - Added check to the client thread for strict data processing enable when processing the sentinel record, so if strict data processing is disabled, then the current data is processed and data sync is performed, even if the message count is wrong

3. IData plug-in:
    - Fixed some Client GUI issues.
    - Added spanning mode support, clamp to frame buffer section 1 if number of frame buffer sections is greater than 0.
    - Added check to see if rendering on the main viewport is disabled, if so the plug-in resets the ClearPlanesBit of the main viewport and sets this bit on its' viewport, this allows the plug-in to control background drawing, good for overlay channels.
    - Added support for automatic pixel format determination.

4. Advanced ocean plug-in:
    - Fixed problem with crashing when database paging.
    - Fixed problem with ocean being visible through terrain where transparent polygons like trees and fences are rendered.
    - Fixed BowSpray effect to work with ViXsen.
    - Made changes so that light pos and intensity in IR mode could be made independent of moon.
    - Made textures/effects get embedded inside plug-in file.
    - Switched to doing 2 pass blur for water reflections to eliminate 'multiple image' problems.
    - Modified to use new variable intensity spotlights.
    - Added partial support for inland water. Currently only works for non-geocentric, non-morphing databases.
    - Advanced Ocean:
    - Reduced contribution of the small ripples to bring it more in line with the relative wavelengths of the large and small ripples.
    - Modifications to reduce tiled appearance of ocean bump map.
    - Toned down the height of the ripples for the mid sea states.
    - Increased size of ripple texture.
    - Added support for resetting the ocean time when ocean is enabled. This allows correlation of ocean across IG's.
    - Fixed problem with a seam between 3D and 2D ocean that was recently introduced.

5. Volumetric cloud plug-in:
    - Added better support for ViXsen NVG and IR modes.

- Modified to use alpha test to only render clouds where not completely transparent. Also now write the depth buffer. This was done to provide better interaction with the moon halo in ViXsen NVG mode.
- Improved support for fogging. The opacity of the clouds now increases as fog increases. This fixes the strange looking issue of fogless patches between the clouds.
- Added a skirt between the clouds and the horizon to prevent things like the sun and moon horizon glow from showing through the gap.
- Made textures embedded in plug-in file.
- Modified fog based alpha so that it only takes effect in the more distant half of the fog range. This more closely resembles exp^2 fog, and also keeps nearby clear sky completely transparent so moon halo is visible in NVG.
- Modified range of vol cloud near clip plane to be just beyond the model rather than inside the model. This is because vol clouds now writes to the depth buffer.
- Modified to use new variable intensity spotlights.
- Added volumetric cloud skirt.
- Fixed problem with z-fighting between volumetric cloud skirt and terrain/ocean.
- Fixed a problem that causes an assertion in VTree every frame in debug mode.
- Fixed flickering problems with large area non-geocentric scenarios.
- Fixed problem with adding radius onto entity position twice over for determining the volumetric cloud slice ranges.

6. Standard Ocean:
   - Fixed crash bug when duplicating a boat wake fx. Found when trying to add an entity in the Fly MUT which had a CIGI type 0 which was mapped to a boat wake fx in the TH57C.scd file.
   - Fixed spotlight code to use the new method for determining the spotlight texture.
   - Added null shader to be used with static (2-triangle) ocean so lighting changes with time of day.

7. RotorWash:
   - Non-rendering optimizations and eliminating pixel shader by using separate alpha blending.
   - New color/intensity mixing GUI updates.
8. Shadow:
   - Fixed shadow clamping on morphing terrains.
   - Changed the number of possible shadow casters from _4_ to 16. Previous changes to attempt to increase the number to 8 were ineffective.

Known Issues

1. With some terrains and the new paging algorithm, during ocean initialization, some

tiles may not get replaced with dynamic ocean.

2.0.0 RC4 Notes

Updates/additions

1. Forced calls to all render functions during initialization to prevent page faults and render glitches.
2. Added function to force pre-rendering of all the lightpoint shaders to eliminate render glitch.
3. Added code to force download of all non-terrain textures, terrain textures were already being forced downloaded.
4. Added new stats level 7.4 mode which only collects statistics around glitches.
5. Added code to pre-load spotlight attenuation maps to help avoid run-time glitches when switching attenuation maps.
6. Added code to pre-load spotlight attenuation maps to help avoid run-time glitches when switching attenuation maps.
7. Updated initialization of lod ranges to auto-update from stored mpf ranges. This fixes the need for touching the MorphDialog to force a range update.
8. Modified the moon to (1) reduce unnecessary updates (2) made the "shadow" area opaque and the same color as the viewport clear color.
9. Added band channel support to reduce impact of mulitiple databases (sensor, otw).

Deficiencies Addressed

1. Fixed divide by zero crash if render function called and no primitives are defined.
2. Fixed problem with screen clear not clearing the entire window when rendering to an offscreen buffer. This problem was introduced on 9/2/05 due to the introduction of the "Overlay Viewport" in Mantis. Problem seen when running 16-bit sensors.
3. Fixed problem with terrain disappearing in sensor mode if the moon is in view.
4. Fog brightening only occurs now when the effective light range is greater than the fog visibility. This was the "sky brightening" bug at F-22. More testing needed for fog-light case.
5. Changed collision segment normal returns to be in CIGI model-space coordinates of the collided model.
6. Fixed grey scale intensity problem in 100% cloud coverage textures, added grey scale shading to other coverage textures.
7. Fixed ownship position update problem if the same position is sent repeatedly.
8. Fixed two bugs with CacheFileServer: (1) Network bandwidth can now be set to maximum during start-up, (2) Dynamic loader will now wait for the CFS engine to initialize before trying to access CFS.
9. Fixed crash bug in Mantis when DiGuys are rendered. VBO binding issue with nVidia drivers after version 61.84.

2.0.0 RC3 Notes

Updates/additions

1. Added VBO cache growth reporting back to the client for the revised cch file.
2. Added the ability to disable collision segment stretching. By default, segments do stretch. This can be disabled through the Detailer GUI on the Collision Segment tab.
3. Added OTW/Sensor support for CSA, where /IrBand, /NvgBand, and /Sensor subdirectories are checked for sensor versions of the database.
4. Modified the default model construction behavior to only create an isector if the model is clamped and clamping is enabled.
5. Replaced the traditional foreground texture loading and background texture loading switches (files located in C:\) with environment variables:
   Dynload.TexturePaging.Foreground
   Dynload.TexturePaging.Background
   These can be set to TRUE in order to force the desired behavior. Setting both to true will generate a warning and the Background setting will be ignored. The default remains to use background texture loading.
6. Added support for shadows to the Advanced Ocean plug-in.
7. Added support to allow Uniform Shadow receiver radius and position to be attached to an entity.
8. Added support for returning collision segment normals with moving models via CIGI.
9. Changed the default discover port in MantisClient from 5050 to 8472 to match MantisServer.

Deficiencies Addressed

1. Fixed problem with light point glow getting clipped at edge of screen by enlarging bounding box and sphere by 10x the point size.
2. Fixed problem with light point glow not rendering correctly when a shader effect is enabled.
3. Fixed crash bug when loading the igDis20x plug-in.
4. Modified code so that the main & CIGI vloses are all initialized with the terrain center. This fixes some problems with ViXsen having to do multiple updates when initializing stealthing.
5. Fixed dead-reckoning problem in igDis20x plug-in, DIS rate data was missing body coordinate conversion.
6. Fixed bug that caused tripod syncing to remain dirty forever, related to previous change to only create isectors for models being clamped.
7. Fixed a bug that kept clamping from being updated for plug-ins that are doing clamping, like the Ocean plug-in.
8. Fixed a problem with name resolution with the IGM integration code. Old method could get confused if Mantis channel names and IDX channel names were the same or overlapped.
9. Fixed a random problem with reliable UDP on systems with large numbers of IGRs

that could result in message assembly errors and Mantis stalling.
10. Fixed some initialization/crash problems with the IData plug-in.
11. Fixed a crash in the ShadowPlugin when using Uniform shadow method and attaching to an entity when no entities exist.
12. Removed a debug coloring line in morphing terrain shader.

Known Issues

1. CacheFileServerApp does not work well with small numbers of IGRs and larger values for Network Bandwidth. Connection problems can occur. If suspected then set the Network bandwidth to 2000.

2.0.0 RC2 Notes

Updates/additions

1. Added support for guard band resolution via nVSync driver.
2. Added event lock to prevent new file I/O from starting while actively rendering.
3. Added new CachedFileServer plug-in and host application for improving database paging and rendering performance on CSA systems with ICS channel.
4. Updated thread priority assignments in Mantis to improve performance.
5. Added VTREE_DISABLE_RDTSC environment variable so that RDTSC can be disabled on laptops or other computers using SpeedStep which can cause problems with RDTSC.
6. Optimizations to the render stats to improve performance. Also divided statistics level 7 into 7.1 (VTree stats disabled), 7.2 (level 1VTree stats enabled) and 7.3 (level 2 VTree stats enabled). Changed what is in each VTree stats level: 1 = basic stats, #polygons, #entities, 2 = adds tex/mat info and entity/fx render time, 3 = adds fx info and node render/cull time, 4 = adds node update/non-render time and callback info.
7. Added support for IDX spanning mode.
8. Added support for up to two spotlights when using shadows. Only the first spotlight casts a shadow. Made spot light shadows use actual spotlight position to cast shadows rather than from an infinite light source.
9. Added support for model-to-model segment collision detection.
10. Removed support for old shadow code based on cg2ShadowControl.txt file.
11. Changed the default config file directory for MantisClient to be MantisInstallDir\bin.
12. Changed the default config file directory for Detailer to be MantisInstallDir\bin.
13. Added ability to soften mask edges using alpha in the ChannelMask plug-in.
14. Changed default maximum far clip to 200000.0.
15. Changed the general visibility slider in MantisClient to be logarithmic.
16. In the CIGI plug-in(s) added support for controlling the enable state for spotlights based on Load_Hide/Load_Show entity state for the model associated with the light if unattached, or its parent model if attached.
17. Removed SireHUD support.

18. Removed SPI support.
19. Removed 3DLabs wavelet compressed texture support.
20. Modified discovery address to be limited broadcast on selected UDP IP address instead of straight broadcast to everywhere, if TCP is selected then no change.

Deficiencies Addressed

1. Fixed some bugs with the IGM integration code with IDX.
2. In standard ocean plug-in fixed a crash for terrain height query when the coordinate within a patch is just barely negative.
3. Fixed problem with shader effects getting strangely lit at night when moon is below horizon.
4. Fixed bug in which prevented the viewport from being sized properly if the ShadowPlugin was loaded. The first viewport was being resized properly, but the shadow plug-in installed it's viewport first, so the wrong viewport was being resized.
5. Fixed a bug in which channel bias settings would only be applied during a session if the view was being updated, usually through CIGI.
6. Fixed problem with CIGI multi-part message sync control, didn't check the component class and this sync processing was being enabled if a model part component control with ID of 17 was received, as seen with the BOTDemo.
7. Fixed a thread deadlock that occurred when a database change was made from the Content/Terrain tab and then immediately selecting the Stealth tab.
8. Fixed bug in which environment visibility range was not being scaled by the visibility range scale in all cases.
9. Added check against foglight parent model so that foglight can illuminate it's parent properly, problem occurred if the foglight visibility range was less than the foglight distance to parent model origin, then the foglight was disabled, now the foglight can be positioned anywhere on it's parent and still function properly.
10. Added missing initializers to copy constructor, this was causing random crash when rendering particle effects created from template in Mantis as seen by F35.
11. Updates to better handle cloud textures not being present in the cache. If cloud texture is missing then a substitute error texture is applied. If this error texture is missing, then the cloud layer is disabled.
12. Fixed problem with light points, volumetric clouds, precipitation rendering on top of the screen blank entity.

2.0.0 RC1 Notes

Updates/additions

1. Added defragment capability to Celerity.
2. Made light point node halos drawn with floating point screen coordinates so that they do not snap to nearest pixel while flying through database.
3. Added a message box when plug-ins fail to load.

Deficiencies Addressed

1. Fixed error in vtLightPointNode copy constructor that caused crashes.
2. Fix for the problem of calculating the incorrect maximum morphing ranges (using the wrong radius for one of the calculations).
3. Gave vtGridCache a first class smart pointer referece to the node that it is caching in order to prevent geometry nodes from going away in the paging thread while intersection testing was working on a cached geometry node.
4. Bug fix for GeometryNodes potentially being deleted while an intersection test is traversing one because it was previously cached.
5. Bug fix for "disabling" morphing not disabling light point morphing.
6. Bug fix for non-morphing terrain geometry still morphing (in a very incorrect way to boot).
7. Adjusted minimum point size to be slightly smaller in lightpoint shader. Fixed bug where bi and uni directional lights were not being clamped properly.
8. Bug fix for the morphing range table in the render thread's render context never getting updated.
9. Added Save/Restore capability for Morph Dialog in each terrain state.
10. Added Force Morph Convergence Range capability to Morph Dialog.
11. Fixed buffer overrun in stats logging code, and added the MPF to the MEL output file.
12. Added m_BandType member to ChannelState so that viXsen can set it before the channel is created on the server. This can then be used by the terrain loader to determine which terrain to load.
13. Fixed an incorrect optimization, where projected vertices were not being calculated and set. They are used by normal poly terrains during intersection testing and this broke that path.
14. Fixed bug that caused resends to be broadcast regardless of the number of peers in the UDP connection. Now resends to a single peer will be unicast.
15. Fixed a GUI bug related to IGM/Mantis integration changes.
16. Reduced amount of texture distortion apparent on the texture render method in the free fall precipitation fx.

2.0.0 Alpha Notes

Updates/additions

1. Branched from TOT code – initial version, includes:
   a. Morphing terrain support
   b. CSA changes.
   c. Enhanced IGM integration, Mantis and IDX channels correlate.

1.9.0 Final Notes

Updates/additions

Deficiencies Addressed

OceanPlugin

1. Fixed a random MantisServer crash on a non-rendering MFP channel when hyperjumping with the OceanPlugin active.

igCigiV2

1. Modified the frame counter comparison during synchronization to be controlled by the use of strict data processing. Strict data processing is currently controlled using the SensorControl packet enable. Network read timeout messages are now only printed if strict data processing is enabled and verbose level is greater than 0.

1.9.0 RC12 Notes

Updates/additions

Deficiencies Addressed

General

1. Fixed a terrain extension problem seen with the TH57C v10.4 database.

OceanPlugin

1. Fixed Z-fighting problem between the ocean geometry and the shoreline that occurred when the eyepoint was approximately 20K dbu from ocean.
2. Fixed ocean texture initialization problem, this texture was not being defined until the eyepoint was approximately 20K dbu from the ocean.

1.9.0 RC11 Notes

Updates/additions

Deficiencies Addressed

General

1. Fixed a startup problem where the alpha threshold for the terrain was not being set correctly in one-pass mode.
2. Fixes to MantisClient and plug-ins with a CIGI interface to prevent crashing if igCigiV3 plug-in is loaded and CIGI3 data is received.
3. Fixed a memory leak that occurred when models were added and removed very rapidly.
4. Added terrain switch control logic to allow switch nodes in terrain with

specially offset IDs to be placed in the external refs table.

MantisClient

1. Fixed a crash in Stealth dialog when models are added and removed very rapidly.

igCigiV2

1. Modified the CIGI Component Control packet for controlling terrain DOF.

OceanPlugin

1. Fixed a delay in initialization that stalls the rendering thread.

1.9.0 RC10 Notes

Updates/additions

Deficiencies Addressed

General

1. Removed the pixel readback functionality which is no longer used
2. Added force render complete functionality to control glFinish() calls, off by default.
3. Fixed thread deadlock that occurred randomly when adding/removing clouds rapidly, the cloud would be partially deleted (VTree objects) but still be in environment, modified code to remove clouds from environment earlier in removal process, other igSynchronized::Parent() changes.
4. Fixed memory leak in igSynchronized class, added destructor for ElementInfo class to delete query and modify ElementInfoFunctor objects
5. Modified igSynchronized::Parent() method to return an AutoPtr, updated affected code, this change was made to increase thread safety, added call to lock parents around code that iterated the parents in an explicit loop, added pointer checks against NULL.
6. Added pointer check against NULL property list pointer, can happen when the shadow plug-in is added to an .mpf file that does not already have a shadow plug-in property list
7. Fixed bad delete of useless pre-transform node after taking it out of the tree.
8. Fixed bug in SyncPrecipitationType() when trying to attach the precipitation to a viewport, the code didn't properly handle multiple plug-ins creating vtViewports, for example the precipitation didn't correlate with rolled channels if the TestPattern plug-in was loaded, modified the code to look for the main viewport which should have the same name as the parent window
9. Segment collisions with the dynamic ocean now work.
10. Added current data sync time to data/frame sync change message
11. Fixed bug in which the test pattern plug-in did not function properly if the shadow plug-in was loaded, the code only considered 1 additional vtViewport, so the code now removes all vtViewports from the vtWindow, adds the shadow viewport and adds back the original vtViewports.

12. Fixed a problem when resolving the LOD information with the paging dbase range table, databases like the Korea database have LOD min/max range values that don't match the range table exactly, so modified the resolution algorithm to be more tolerant; also added a check for a NULL return from rc->CurrentLodRangeMap().
13. In the vtDynamicLoader library, fixed a thread deadlock that stalled the rendering thread, temporarily unlocked the entity so that the rendering thread can call the entity pre/post render callbacks

Particle System Fx

1. Performance enhancement using vertex arrays to render particles.
2. Per-particle color with spotlights
3. Three spotlights
4. Vertex arrays
5. Miscellaneous fixes, speed-ups, etc.

MantisClient

1. Fixed a problem where occasionally a model could be added through CIGI, but not show up in the Stealth dialog.
2. Fixed bug where cloud layers were not cleared on New config.

MantisServer

1. Fixed screen dump crash.

igCigiV2

1. Updates to the igCigiV2 plug-in to tighten up the data processing, stricter use of the frame counter and thread synchronization.

OceanPlugin

1. Fixed divide-by-zero that caused the slowdown when bow wakes ran overnight.
2. Improved rendering for bow wakes. Changed from one triangle strip 5 vertices wide to 2 strips, each 2 vertices wide (one down each side of the ship). When the bow wake is flat, it is drawn with the same settings as the stern wake (stencil set to draw only on water; polygon offset to keep the wake in front of the water). When the bow wake is raised, the normal depth buffer is used to allow the wake to draw in front of the ship hull.
3. Ocean repeats after the given loop time. The new data is calculated the first time through the loop, then the stored data is used in subsequent iterations.
4. Added directionality control how strongly the waves follow the wind direction.

RotorWash

1. Various performance and SMC fixes.

1.9.0 RC9 Notes

Updates/additions

Deficiencies Addressed

MantisServer

1. Enhanced the performance spotlight by increasing the beam shape resolution near the beam origin.
2. Incorrect culling information on left channel of tiled IDX system, resulted in the same polygonal load as a non-tiled channel.
3. Fixed bug with swing animations that would cause the render time to spike.

Ocean Plug-in

1. Cache performance improvements.
2. Geocentric support.
3. Glint on water (need NV40 or better graphics).
4. Fix for water appearing through wakes.
5. Added support for additional CIGI component controls to control LOD bias, tile radius, wake and glint enable. See updated Mantis CIGI v2.0 Component Controls Extension document.
6. Fixed sync issue between GUI state and the individual servers. This resulted in different information, such as LOD bias, between the servers and caused issues like seams in wakes on tiled IDX systems.

igCigiV2

1. This fixed a problem in which special effects like bow and stern wakes cannot be re-parented, these fx's appear as if they cannot be hidden or detached. This can happen when the fx is detached using the CIGI EntityControl packet.
2. Added CIGI support for Mantis system commands to control features such as two-pass alpha rendering, statistics, etc. Updated component controls are documented in the Mantis Componont Controls extension document for CIGI 2.0.
3. Fixed sync issue between CIGI state and the environment GUI in MantisClient. The environment GUI will now reflect any received CIGI state information rather than overriding from the GUI.

Shadow Plug-in

1. Performance fixes.
2. Correctness fixes.
3. Mantis stats were sometimes shown in the shadows.
4. Small bug fix where the color mask was incorrectly set to full color filter. This interferes with ViXsen's request to set the color filter to "green" for NVG views.

TestPattern Plug-in

1. A bug fix in the RC8 version is required to remove Mantis stats from appearing in shadows, and to improve performance with the test pattern plug-in (even

when it is not enabled).

AssignCigiViews

1. Fixed problem not correctly setting CIGI view IDs.

1.9.0 RC8 Notes

Updates/additions

Deficiencies Addressed

MantisServer

1. Fixed a bug where scene-graph animations were not correctly sequencing, and were causing a rendering load spike every 1.0 seconds (or so).
2. Fixed a bug where non-paging models (VTree models) were used as terrain that was causing an abnormally large main memory footprint and reduced intersection test performance.
3. Added another level of intersection cache testing.
4. Fixed a bug that was causing intersection testing to ignore cached voxel information.

Mantis Native Paging Plug-in

1. Reduced main memory footprint for cached textures

Shadow Plug-in

1. Performance enhancements throughout.
2. Updated documentation
3. Added 0.25 and 0.5 update rate for intersection testing.
4. Fixed bug where MantisServer statistics information was included in the model shadow when the TestPattern plug-in was loaded.
5. Cloud intersection tests now work properly and have better performance.

TestPattern Plug-in

1. Fixed a bug that was causing an unnecessary screen clear.

AssignCigiViews

1. Fixed to use IGM PlatformSDK

1.9.0 RC7 Notes

Updates/additions

1. Various updates to the Mantis User's Manual and documentation.
2. Added profile save/restore per database paths and particle dispersal patterns to the RotorWash plug-in.
3. Added new tests patterns to TestPattern plug-in.
4. Initial eyepoint should now be near the center of geocentric terrains.
5. Enabled fog for lightning and added fog punch through effect (if enabled) for

lightning.
6. Optimizations for updating model placement.
7. Added code to dump information about servers that are not responding to data sync.
8. Sorted the server lists in MantisClient, makes it easier to view the available servers on IDX with lots of channels.
9. Added a Standard (FOV, projector boresight angles) GUI for defining channel layouts.
10. Added an enable/disable check box to Server for VBO. Default is true for nVidia/Independence, false for anything else
11. Improvements and updates to the Shadow plug-in.
12. Improved model and object cleanup.
13. Changes for writing revised CCH file.

Deficiencies Addressed

1. Fixed infinite loop which caused dump whenever server tried to shut down with city lights present in the scene.
2. Fixed issue with skirt occluding haloed light points that extend past the far clip distance.
3. Made the fog flashback from spotlights attached to entities conditional on parent model visibility.
4. Modified code to restart a playing fx if is re-parented, e.g. DiGuy would stop playing if parent changed.
5. Made moon glow calculation more efficient & fixed bug with moon glow fading out when moon drops below horizon.
6. Reworked the city lights and fixed it for geocentric DBs.
7. Fixed a bug in a for loop when returning a model to the model cache, was causing an infinite loop and hung the server(s). Also modified the code to get a model from the cache at the beginning of the set (returns to end of set).
8. Fixed the time of day sync problem between channels on tiled IDX systems.
9. Fixes for syncing animations across tiled IDX channels.
10. Fixed LOS problem where tri-strips used the same vertex order as tri-fans and polygons, caused random misses.
11. Patched the RGB texture reader to work on 1 component headers which have incorrect dimension of 1 but a ysize > 1.

1.9.0 RC6 Notes

Updates/additions

1. Integrated USAF 1951 test pattern into TestPattern plug-in.
2. Added support for enabling/disabling wakes in the Ocean plug-in.
3. Performance improvements in the Ocean plug-in.
4. Added RotorWash plug-in as a separate subproduct of MantisClient and MantisServer. This will require new MantisClient and/or MantisServer unlock keys. Previously the RotorWash plug-in was unlocked using the Marine subproduct code.
5. Added support for quality and performance spotlights to brighten fog or cause fog

flashback.
6. Added support for GL_CLAMP_TO_EDGE. This is now the default in cases where the file format only supports a single "clamping" mode (e.g. OpenFlight and TerraPage).

Deficiencies Addressed
1. Fixed a state problem with lightning so that if lightning is disabled while active the lightning strike does not get stuck on.
2. Fixed a bug in which model light groups were only added if the model also had parts or scripts.
3. Fixed black ocean problem in Detailer.
4. Fixed a rendering bug between haloes and the channel mask.
5. Fixed problem with entities disappearing from entity list on the Stealth dialog in MantisClient.
6. Fixed lightpoint halo flashing problem due to incorrect range determination.
7. Removed an erroneous extra copy of MNP texture cache textures that were hanging around after initialization because the transient bit on those textures was not set. This resulted in twice the memory usage for MNP textures requested in the .CCH file.
8. Fixed problem with LOS isectors returning first hit against paging terrains, instead of closest hit.
9. Fixed crash bug in the Ocean plug-in if sky model is disabled in Mantis.
10. Changed the igPlacement angle encode/decode from using 16-bit fixed point math to 32-bit single precision floating point, fixes precision problem seen with large models such as ships when pitching longitudinally.
11. Misc fixes to state tracking/render context initialization in the RotorWash plug-in so that creation of companion rotor wash does not cause a crash.
12. Fixed a bug: Activating a 3rd performance spotlight was leaving texture matrix (and tex gen) state in a bad mode that prevented proper use of texture unit 1 from then on. This was causing detail texture to disappear (or whatever texture was on unit 1 on a multitextured object) permanently.

1.9.0 RC5 Notes

Updates/additions
1. Added support for resetting all global light group intensities using a group id of -1, in Mantis global light group intensities are now reset back to 100% on CIGI reset or database switch.
2. Changed collision segment session assignment to better distribute the load amongst available mission function processors.

Deficiencies Addressed
1. Fixed some problems with the CIGI rate interpretations for both geocentric and UTM terrain projections.
2. Fixes to preserve time settings when loading an mpf file and starting Mantis, also when changing between databases with different origins.

3. Fixed bug in which the performance spotlight was not being rendered on the dynamic ocean.
4. Fixed "range crash" in igOceanPlugin by making sure that the border is at least as big as the dynamic ocean tiles.
5. Fixed a couple of Rotor wash interaction issues: particle effects disappearing and tiled IDX continually thinning the horizontal field of view until it reduces to nothing.
6. Fixed a bug in the igQueuedSync destructor that caused the element update map to fill up with potentially thousands of (empty) entries as the actual update functors inside were being deleted. This resulted in object deletion to take longer than necessary.
7. Fixed a bug when attaching to an attached model in the Stealth dialog for a geocentric database, the attached model offset was being used as the geocentric position, instead of an absolute geocentric position.
8. Modified the dominant light determination code in igShadowPlugin to only consider directional lights. Per entity foglights were confusing the light determination and misdirecting the shadows.
9. Fixed bug in VTree where sibling geometry (containing transparency) of MNP tile geometry was not being rendered in transparent pass, there was an incorrect test against the previous silbling node containing transparency, this was the tree alpha problem on the TH57 database where some of the trees were not rendered correctly.
10. Fixed culling problem that was seen on an 8-way tiled IDX system that was doing scaled tiling + regular tiling.
11. Modified the animation node rendering to use vtRenderContext::AnimationTime() and AnimationTimeBias(), this fixes problems when the animation is rendered on multiple channels and can show seams on tiled systems if out of sync.
12. Fixed a bug during model rendering in which the render context LOD scale was not being restored from model to model. This prevented scene load management from working properly in Mantis if an MNP database was active, which currently overrides the LOD scale with a value of 1.0.
13. Updated the LOS isector code so that collision segment LOS isectors against a paging terrain actually get processed using isector code which utilizes terrain caches.
14. Minor optimizations to the VTree particle fx.

1.9.0 RC4 Notes

Deficiencies Addressed

1. Fixed isector problem with models containing voxel information, caused HAT/HOT intersection testing to fail occasionally.
2. Modified data sync enable code so that data sync is active when objects instantiated immediately following CIGI reset. This problem caused a seam in particle effects, clouds, lightning, etc. on IDX systems in tiled mode.
3. Fixed precision problems in spotlight and entity foglights that were evident in geocentric mode. Lights appeared to jitter and change amplitude.

4. Added support for dominant scene light to OceanPlugin. This allows for the moon at night to illuminate the ocean.
5. Fixed bug in OceanPlugin that caused a crash if the OceanRange was smaller than the dynamic ocean size.
6. RotorWash plug-in updated to work with ViXsen.
7. Updated the Ocean geometry code in OceanPlugin to eliminate cracks in the ocean when far from the origin.
8. Fixed some thread deadlock issues that were causing the servers to hang when switching databases.
9. Fixed bug in ShadowPlugin that was preventing ocean clamped models from clamping to the dynamic ocean properly.
10. Fixed render bug in screen blanking against clouds.
11. Fixed bug in MantisClient when switching between Channels/Params and Channels/Layout, data was not being preserved.
12. Updated MantisClient stealth dialog code to check for hemisphere crossing when stealthing, fixes problem where the position unexpectedly changes to some large value when going from north to south hemisphere for UTM terrains.
13. Updated MantisClient code so that plug-ins cannot be removed when the client is running.
14. Fixed a crash when isolated clouds are re-created after a CIGI reset.

1.9.0 RC3 Notes

Deficiencies Addressed

1. Fixed HAT/HOT terrain isector problems which resulted in erratic operation and consideration of non-visible geometry.
2. Fixed some crash problems caused by OpenGL objects being created and/or destroyed in non-rendering thread.
3. Fixed application of CIGI rates to entities.
4. Fixed bug which disabled backface culling when shadows activated.
5. Changed 3D performance spotlight texture from RGBA to luminance to reduce memory requirements. Increased resolution to reduce rendering anomalies.
6. Fixed isector bug related to external references in paging terrains with voxel information.

1.9.0 RC1-RC2 Notes

Updates/additions

1. Various performance updates, including support for Vertex Buffer Objects (VBO).
2. Foglight glare effects on ownship and wingmen.
3. Shadows for ownship and wingmen.
4. Isolated clouds.
5. Switch, DOF and animation support extended to external references in paging databases.
6. Lightpoint glow effects.
7. igStats plug-in, provides information about render performance for the

MantisServer(s) within the MantisClient application.
8. Added CIGI packet statistics to the igCigiV2 plug-in.
9. Automatic detection of IDX tiling mode to update culling information with Mantis. Eliminates the need for the user to break up the channel frustums on IDX for maximum rendering performance.
10. Support for per-entity alpha reference in one-pass alpha mode within Mantis. Allows the user to tune the alpha reference for each model in Detailer.

Deficiencies Addressed

1. Modified the entity rendering algorithm to fix rendering anomalies between the clouds and culture with transparency on a paging terrain.

1.8.0 RC18 Notes

Updates/additions

1. Updated performance spotlight culling code.

Deficiencies Addressed

1. Changed the default diffuse and ambient for "color materials" to better support terrains. There was too much specular and not enough diffuse.
2. In ToMnp added logic to remove fine boundary LODs when finer terrain LOD tiles have been stripped. Geometry from coarse boundary is moved to core geometry.
3. Fixed bug in which the fog enable was being updated incorrectly by the model infinite visibility above the highest cloud layer code, if general visibility was disabled on startup, all but the first model would appear black
4. Made some changes to the specular material handling to be more correct.
5. Fixed a bug where the sun specular component was being set to zero.
6. Fixed bug in which fog was being enabled for the cloud(s), even though general visibility was disabled, this cause some clouds to render black until general visibility was toggled.

1.8.0 RC17 Notes

Updates/additions

1. Added CIGI component control to enable/disable texture units on server(s).
2. Updated the DynamicLoader library to enable automatic LOD updating if the LOD has a non-zero fade transition range. This enables fade LOD processing for external references in the paging database if fade LOD is enabled in Mantis and the external references contain LODs with non-zero transition ranges.

Deficiencies Addressed

1. Fixed crash bug in Mantis when cylindrical bounding volumes intersect other cylindrical bounding volumes, observed using the Collision MUT.
2. Fixed radius problems with bounding volumes that use cylinders, models will have to be re-converted.
3. Fixed a data synchronization problem in which dirty objects may not get cleaned properly resulting in lost data. This should only affect clamped moving models.
4. Fixed problem in Detailer in which CIGI lightgroups were not being updated properly when a model with lightgroups is added.
5. Fixed problem in Detailer in which the model was not clamping to the ocean using the specified clamp bias.
6. Updated the CIGI plug-in to disable all data and frame synchronization (including nVSync if enabled) during CIGI standby mode. This was done to prevent nVSync from signaling an High Availability event and cause a channel(s) to be marked offline.

7. Fixed some problems with fade LOD when the LOD only contains a single child, the geometry was not fading in properly due to alpha test problems.
8. Fixed a couple bugs in the performance and quality spotlight implementations, including interactions with clouds and DIGuy.
9. In OpenFlight2VTree changed the geocentric offsets that were being applied that were causing small cracks due to round off error. The offsets are now in increments of 100 to avoid this problem.
10. Fixed a bug with the performance (3D Texture Volume Map) spotlight that caused incorrect rendering when descendant batch was enabled.
11. Fixed problem with TestPattern plug-in which caused the render stats to show 0 polygons.
12. Fixed lightpoint size problem in TestPattern plug-in when a model with lightpoints was being rendered.

1.8.0 RC16 Notes

Updates/additions

1. Added global enable to material scale (rain darkening) logic, including CIGI.
2. Changed scaling of rain darkening and fog punch through to 0.00-100.0 from 0.0-1.0.
3. Added code to delete nodes in paging databases (TXP or MNP) named in an external file: cg2IgnoreNodes.txt. This feature allows for the runtime removal of certain nodes, like tree or culture.

Deficiencies Addressed

1. Defaulted radial fog to "off" because it disables per-pixel fog.
2. Updated code to always allow animation restarts to pass through. Fixes a bug reported by B. Dickens
3. Added workaround to set glColor to white so that emissive polygons show up correctly.
4. Fixed memory leak in sky model.
5. Fixed bug in MantisClient, was not resizing properly when loading an MPF file w/plug-ins. Also added code to re-position Start button in center when adding/removing plug-in tabs.
6. Fixed a UTM conversion bug in MantisClient on the StealthTab for hyperjump. The converter was re-computing the UTM zone based on the hyperjump longitude, should only be done based on the terrain origin longitude.
7. Disabled isector governor which was only allowing 10 isectors per frame to be updated. The problem with this is that on IDX, sometimes one SR of a channel would hit the limit and another one wouldn't. This means that the SRs of a channel are not updating the same set of isectors in a given frame. The result is that models (particularly if given a rate through CIGI) could (and did) get out of sync.
8. Fixed a bug in rendering instanced geometry (two or more of the same model) that caused transparent geometry in two-pass mode to sometimes not render. Would see flashing polygons on the model(s).

9. Fixed a bug that was causing model parts to remain dirty if their switch or dof nodes were not found in the model template/model.
10. Updated the CMS licensing code and igLicense to only print the status of the CMS license once and to prevent any fatal error messages from being printed, added argument to ValidateLicense() to optionally print any messages.
11. Updated view/entity matrix processing logic to use the new ignoreViewMatrix flag for the channel mask plug-in, this fixes matrix roundoff error that was making the channel mask(s) disappear for slight view changes.
12. Fixed a bug where the new 3D texture spotlight was getting very poor performance with light points in the scene.
13. Fixed a bug that caused the 3D texture spotlight to be off-axis slightly.

1.8.0 RC15 Notes

Updates/additions

1. Added support for lightpoint fog punch through. Fog punch through can be enabled on a per lightpoint basis in the OpenFlight model or enabled globally for all lightpoints in MantisClient (via GUI or CIGI) or Audition. This feature is only available on platforms that support the glFogCoordExt extension, this includes nVidia based platforms such as IDX. Fog punch through is not available on AAlchemy.
2. Added new igIgm client side plug-in for updating gamma correction table and enabling video on a per SR basis. This plug-in is for IDX only.
3. Modified rain darkening code to be material name sensitive. Only materials which have their name suffixed with "_$RD" will be allowed to darken when rain darkening is enabled. Also modified the associated rain darkening CIGI component control to allow for separate ambient and diffuse scaling.
4. Added code to send an CIGI Image Generator Response Message with information about disabled session(s). This is the same message as printed to the MantisClient message log when a session is disabled via HiAvailability. This message is only available on platforms such as IDX that support nVSync and have HiAvailability enabled.
5. Added support for building offset geometry in OpenFlight UTM databases converted to MNP with the ToMnp utility. This is the same jitter fix as previously implemented for TXP UTM and LCC databases.
6. Updated spotlight implementation to include performance mode based on 3D texture. This allows the user to select spotlights optimized for quality (shader-based) or performance (3D texture-based).

Deficiencies Addressed

1. Fixed a DOF angle position bug when controlling DOFs in the terrain.
2. Fixed a bug causing polygonal terrain intersection testing to fail, this problem was only in v1.8.0 RC14.
3. Updated the igCigiV2 plug-in code to terminate CIGI data processing if an invalid packet id is received. It appears that the Boeing Host Emulator (HE), which is built using their CIGI SDK, sometimes inserts an extra byte (val = 0) which corrupts the

CIGI data packet processing. This extra byte is seen as the start of a new CIGI data packet with a packet id of zero.
4. Fixed a bug in which non-embedded textures for externally referenced models in paging databases were not being resolved from the paging database directory.

1.8.0 RC14 Notes

Updates/additions

1. Made CIGI and DIS plug-ins true self-contained plug-ins.
2. Added rain darkening support, done using material scaling. Added CIGI environment component control.
3. Added continuous model scaling.
4. Added support for model cache and model template cache. Used to reduce model instantiation stutter.
5. Added support for light point fog punch through. Set using the OpenFlight parameters.

Deficiencies Addressed

1. Replaced explicit calls to SetBlendFunction() with SetTransparency(), for models with geometry nodes that don't have the NodeTrans bit set, this breaks Fade LOD, NADS RightNow Incident: 040329-000002.
2. Fixes for Detailer articulation rates not working when model is added through CIGI. If an articulation rate was assigned in Detailer, then load the model through CIGI, the rate was not applied.
3. Fixed crash bug when large window size is requested, window size is now limited to 4096 by 4096.
4. Fixed problems with reference counting of python objects, this caused random crashes, added code to delete python scripts in vtFadeEntity destructor.
5. Fixed some problems when adding and removing clouds, sometimes caused random crash.
6. Fixed bug in the OpenFlight2VTree summary file that reported descendant batch was always on, even if it was off. Added command line option and summary file output for descendant batch multipass alpha option.
7. Fixed multi-texture bug in OpenFlight2VTree. Response to RightNow incident 040425-000000.
8. Fixed a texture bug in DiGuy plug-in.

1.8.0 RC10-RC13 Notes

Updates/additions

1. Modified code so that terrains are not affected by Scene Load Management (SLM).
2. Reduced performance penalty of statistics level 7.
3. Added “voxel-based intersection acceleration” (VIA) for cultural features on paging terrains. This new capability is activated during the conversion of the model from OpenFlight to VTree using the command-line arguments to OpenFlight2VTree. The “-via 1” option enables VIA for the model. VIA cannot

currently be enabled when using the GUI option of OpenFlight2VTree, and it is only enabled if the conversion options include array geometry and triangulation. VIA increases LOS and HAT/HOT performance on cultural features by reducing the processing time by up to 80%.

4. Optimized model rendering performance now allows many more models to be added to Mantis. Tests with up to 500 moving models have been performed at 60Hz on the Independence™ platform.
5. Updated the vtDynamicLoader to re-parent geometry in large UTM or LCC projected TXP databases with a tranlation node to reduce jitter.
6. Added support to the ToMnp tool to generate relative vertex data to minimize jitter in large databases.
7. Changed the behavior of scene load management to improve it's performance.
8. Changed the meaning of the scene load management statistics to better reflect their intended meaning.
9. Modified the ChannelMask plug-in in an attempt to improve render performance on nVidia based hardware.
10. Updated the ToMnp utility to support source data that is not in the row/col structure.
11. Added code to only shutdown Glide if running on AAlchemy, even if the glide3x.dll is found.
12. Modified code to prevent .vt terrains from being duplicated. This is unnecessary and expensive, especially for large terrains (like NADS).
13. Modified CIGI view id processing for Mantis channels, multiple Mantis channels can now have the same CIGI view id which is necessary for multiple SR IDX configurations. This code change was made in conjunction with the new AssignCigiViews.exe utility.
14. Made VAR memory usage stats show 3 decimal places. 1 was not enough precision for smaller databases. Changed in response to NADS RightNow incident 040115-000015.

Deficiencies Addressed

1. Fixed some problems in ToMnp when converting UTM databases, culling spheres not combing properly.
2. Fixed a problem with terrain paging in which two-pass render mode allowed paging to occur twice as fast as single-pass render mode. Terrain paging now occurs at that same rate independent of one-pass or two-pass mode.
3. Fixed random MantisServer hang on Stop, caused by some new diagnostics code.
4. Fixed lighting problem.
5. Fixed bug that allowed attitude clamp to be enabled even if altitude clamp was disabled.
6. Fixed cull sphere problem that prevented a light point from rendering if there was only one light point, the cull sphere had zero radius.
7. Fixed a bug in reading animation loop and last frame durations from OpenFlight file version 15.8 (Creator v2.6) files. Creator v2.6 defaults these values to zero, instead of something obviously invalid (-1). So, I changed a >=0 to >0.

1.8.0 RC9 Notes

Updates/additions

1. Changed inside near clip rendering algorithm to be disabled by default, must be enabled through CIGI component control. CIGI component control also allows user to specify the value of the alternate near-clip distance (defaults to 0.01).
2. MNP skirt optimizations using depth range.

Deficiencies Addressed

1. Updated code in the plug-in server which handles dirty objects. Also fixed an object lock problem.
2. Fixed a bug that caused client to crash when changing databases through CIGI. Was introduced when adding support for DOFs, switches, and animations in .vt terrain models.

Outstanding issues not yet addressed

1. Automatic load management still too aggressive.
2. Tiles in large paging databases are not parented by a translation node and their vertex data made relative to this translation data. The result is that database geometry may jitter due to round-off errors. This will be addressed in future versions of Mantis.

1.8.0 RC6-RC8 Notes

Updates/additions

1. Updated Mantis to use Python v2.3.
2. Added support for controlling DOF, switch, and animation nodes for .vt terrain models via CIGI.
3. Added visibility range 'scale'. This involved adding a slider to Client GUI Environment tab. This slider specifies a multiplier (0-10) for all visibility ranges (general, inside clouds).
4. Optimized cloud layer rendering for geocentric terrains.
5. Updates to improve moving model performance.
6. Added support for infinite visibility above highest cloud layer.
7. Added support for rendering ownship model inside near clip. Technique disables depth buffer reading and writing, therefore requires a special model that has polygons ordered from far to near.
8. Added statistics level 8 which provides overlay graphics for monitoring statistics.
9. Added support for sunlight and moonlight attenuation by cloud layers. Attenuation is affected by both cloud layer coverage and severity.
10. In OpenFlight2VTree removed the clean non-geometry option and the vertex array range memory specifier. The clean non-geometry option is undesired and the vertex array range memory specifier is no longer required.
11. Added optimization for rendering MNP terrains. Instead of traversing the repeated pattern of nodes for a given tile, the pattern is recognized and operated on "in

place". This avoids the traversal of the 24 nodes that make up a tile "pattern" and significantly reduces traversal overhead time.
12. Added support for skirt geometry for geocentric MNP databases. Skirt support is controlled by special file with the MNP database name and .hrz extension.
13. Added support for user defined texture cache for MNP databases. User defined cache is controlled by special file with the MNP database name and the .cch extension.

Deficiencies Addressed
1. Disabled precipitation when above the highest cloud or fog layer, if any are present. If no cloud or fog layers are present, then precipitation behaves as before.
2. Added code to update group node cull information if it parents an external reference node in MNP databases. Fixes bug in which external references are not rendered.
3. Fixed code so that radial fog is now enabled on IDX, previous enable failed on IDX but worked for non-IDX nVidia based hardware.
4. Fixed a performance problem with cloud layers having different severities on the independence machine.
5. Fixed horiz and vert asymmetry bug on SetFrustum call.
6. Fixed bug in OpenFlight2VTree in which DOF rotations were being applied in degrees instead of radians. Also added couple of matrix fixes and eliminated some deprecated tokens from the OpenFlight API.

Outstanding issues not yet addressed
1. Automatic load management still too aggressive.
2. Tiles in large paging databases are not parented by a translation node and their vertex data made relative to this translation data. The result is that database geometry may jitter due to round-off errors. This will be addressed in future versions of Mantis.

1.8.0 RC2-RC5 Notes

Updates/additions
1. Support for geocentric databases added, including stealthing, mission functions, curved clouds, depressed horizon, etc.
2. Support for LCC projected databases added, including stealthing and mission functions. Only limited testing has been done to date.
3. The lowest LOD of paging terrains can now be extended to the far clipping plane to provide infinite horizon, especiallly important in geocentric databases.
4. Improved User’s Manual.

Deficiencies Addressed
1. Improved precipitation performance, went from 3 ms to 0.8 ms.
2. Added support for flattening externally referenced models in TXP databases, this improves render performance at the expense of additional paging overhead.

3. Automatic load management now detects overhead time processing such as on-chip AA and nVSync.
4. Improved Z++ performance.
5. Improved synchronization of special effects across channels.
6. Various optimizations to improve processing/rendering performance, such as matrix, LOD and lightpoint processing.
7. Added test in OpenFlight2VTree to warn if a geometry node has the same texture applied as the base texture and detail or multiTexture, or the same texture to multiple texture units, this breaks texture processing in SimGL on AAlchemy.
8. Fixed what appeared to be a memory leak in paging database processing. The problem was not actually a memory leak, turns out that all externally referenced models were being kept in a list, even if the tile that referenced the model(s) was paged out. So now when a tile is paged out and all references to the model are removed, the model is removed from memory.

Outstanding issues not yet addressed

1. Automatic load management still too aggressive.
2. Conversion of TXP to MNP on Aalchemy is not working, either no geometry is visible or no textures are applied to the geometry.
3. Models converted with OpenFlight2VTree may exhibit problems with light point directionality, incorrect placement of externally referenced geometry, or improper LOD transitions.
4. Tiles in large paging databases are not parented by a translation node and their vertex data made relative to this translation data. The result is that database geometry may jitter due to round-off errors. This will be addressed in future versions of Mantis.

1.8.0 RC1 Notes

Updates/additions

1. Initial support for round-earth coordinates/models added, not yet complete. Can fly over a geocentric terrain. Celestial and sky model is finished. Some limited infrastructure for isector processing.

Deficiencies Addressed

1. Fixed bug in terrain normal calculation, returning normal of (1, 0, 0).
2. Increased clamped model performance.
3. Fixed bug in thunderstorm model in which the lighting would repeatedly strike the ground.
4. Fixed bug in which the rain column in the thunderstorm was not lit and would glow at night.
5. Added lightpoint counting to stats level 3, separate from #lights which are actually OpenGL based lights.
6. High Availability has been re-enabled, limited testing on single channel (2 SR’s) IDX2 is successful. Code has been modified to manage the way nVSync

High-Availability processing works. nVSync callback processing may need to be reviewed, appears that leave/join notification occurs too soon.

Outstanding issues not yet addressed

1. Automatic load management, code has been reviewed. Code changes still being made/tested.
2. Drop below 60 Hz under moderate load.
3. Drop to 30 or 50 Hz until SR is rebooted.

1.7.0 RC8 Notes

Deficiencies Addressed

1. Fixed bug in terrain query that incorrectly calculated the terrain polygon normal.
2. Fixed bug in sequenced light point rendering code when descendant batch or two-pass alpha were enabled.

1.7.0 RC7 Notes

Deficiencies Addressed

1. Fixed bug in shader light list traversal, bug introduced in RC6 when light list traversal was optimized.
2. Fixed texture render state tracking bug which caused textures to appear wrong, as well as other things, when descendant batch was enabled.
3. Removed update rate limit on sky model updates, was causing significant delays and upredictability to the sky model updates of otherwise synchronized servers.
4. Fix for the dynamic loader thread using cpu time even when the viewpoint is stationary.
5. Added interrim fix for sequenced light point rendering in two pass mode with descendant batch enabled.

1.7.0 RC6 Notes

Deficiencies Addressed

1. Fixed multi-texture problem in OpenFlight2VTree converter if meshing is enabled.
2. Optimized entity list traversal in vtCollide library to improve performance with large model sets.
3. Added code to support surface material codes in TXP/MNP databases. NOTE: Databases must be re-converted with updated ToMnp.exe utility.
4. Added support for host controlled isometric model scaling.
5. Added TestPatternPlugin to InstallShield.
6. Added command line options to MantisServer for descendant batch, display lists, quiet messages. Also added plug-in loading through ServerPlugins.ini file.
7. Fixed problem with special effects not being removed properly through CIGI.

1.7.0 RC5 Notes

Deficiencies Addressed

1. Fixes for clouds crashing due to overlap and subsequent deletion, also tweaks to cloud layer GUI in MantisClient.
2. Optimizations for cloud rendering (transparent pass), Z++, collision testing and fade lod.
3. Material tab added to ViXsen setup in MantisClient, allows user to tweak material parameters.

4. Fixed bug in which collision segment rendering only checked stats level, independent of stats enable.
5. Added collision bounding volume rendering to stats level 5, render in conjunction with collision segments.
6. Misc fixes to handle window/fx destruction, occasional crash and/or unfreed object.
7. Fix for texture metrics in stats level 3.
8. Fixed problem with missing geometry on some of the external references, encountered on JSF terrain.

1.7.0 RC1-2 Notes

Deficiencies Addressed

1. Fixed OpenGL state tracking problem related to calling display lists. This bug was causing textured geometry to have the incorrect or no texture.
2. Fixed a problem where the vertex array range extension was not being used with Mantis Native Paging (MNP) terrains
3. Fixed a memory leak when writing LOD nodes to VTree format files
4. Fixed a problem when rendering indexed geometry nodes where OpenGL color state was not being tracked properly.
5. Fixed a problem where OpenGL lighting could be disabled after rendering special effects.
6. Fixed a small memory leak in the paging terrain subsystem
7. Added code to force the CIGI “SOF Lead” time to be greater than zero. Entering a number less than or equal to 0.0001 will cause the input field be highlighted and will not be accepted.
8. Fixed a bug that caused the CIGI log file to start playing unexpectedly when MantisClient is started after saving the MPF file with CIGI playing. The MPF reader now sets the CIGI log playback state to “stopped”.
9. Fixed a bug that allowed the moon model to be clipped against the far clipping plane.
10. Fixed a bug that caused on-screen statistics to be “frozen” (not updating).
11. Fixed a bug that allowed statistics gather to remain enabled even when not viewing statistics. This was leading to a large (10-15%) rendering performance loss.

Improvements and Additions

1. Added the ability to load Mantis Native Paging (MNP) archives into Audition
2. Replaced the “Txp2Mnp.exe” tool with “ToMnp.exe”. The new tool has an improved user interface and will accept both OpenFlight and TerraPage terrains as input. The OpenFlight portion is a new capability and should be considered of “beta” status.
3. Q3D INTERNAL: Add the ability for Mantis Unit Tests (MUTs) to save and restore a property list state.
4. Q3D INTERNAL: Increased the number of models in the “MovingModels” unit test
5. Q3D INTERNAL: Changed the “TransportDelay” unit test to allow measuring the

last pixel out, instead of the first.

6. Q3D INTERNAL: Removed debug symbols from VTree library because of a reported performance loss when symbols are present. This will limit our ability to debug crashes in the field.

Known Problems

1. The CIGI plug-in sometimes utilizes 50% of the IGC CPU on Independence platforms. The problem appears to be solved by sending an “IG Control” CIGI data packet to Mantis, with the mode set to “operate”. High CPU usage on the IGC can cause nVSync to be inconsistent and may introduce frame rate drops. This problem is still under investigation.
2. On Independence platforms, there appears to be a performance problem with GLInterceptor version 2.6 and IGM version 2.2. This problem is still under investigation.

1.6.0 RC8-12 Notes

1. Removed numeric rounding for field-of-view numbers on MantisClient 3D channel view
2. Ground fog now has variation based on CIGI opacity and scud settings
3. Haze color can now be set via a new CIGI component control or the MantisClient GUI (visibility color)
4. MantisServer diagnostics and level three (3) on-screen statistics now show the amount of texture loaded and rendered. Rendered texture memory is separated into paging and non-paging memory.
5. MantisServer diagnostics and level three (3) on-screen statistics now show the amount of texture data transferred across the PCI bus on Aalchemy platforms. Note that this is the amount sent in the foreground (rendering) thread. If texture download forcing is enabled, these numbers will be zero for background texture downloads.
6. Improved texture download pacing. Paging textures are now "forced" to download to the OpenGL driver by rendering a part of the texture in a background thread before rendering the associated geometry in the foreground thread. This has the effect of "priming" the OpenGL driver for rendering the new geometry once it is enabled, and reduces stutters as OpenGL would normally have to download the textures within the foreground rendering thread. The following environment variables control texture download pacing:
    a. TXP_DISABLE_FORCE_TEXTURE_DOWNLOAD – set to non-zero to *disable* forced texture downloads from the background thread (default is to force texture downloads)
    b. TXP_MAX_NUM_TEXTURES_FORCED – set this to an integer giving the maximum number of textures to force in a given frame. Since the forcing occurs by rendering a piece of each texture in the foreground (rendering) thread, it is important to limit the number forced in a given frame to control the amount of time spent forcing textures. The default is four (4) for Aalchemy platforms and 32 for all other platforms.
    c. TXP_MAX_TEXTURE_BYTES_FORCED – set this to the maximum number of texture bytes to force in a given frame. As with the number of forced textures, the total byte size of the forced textures is important to limit. The default is 136KB for Aalchemy platforms and 1.1MB for all other platforms.
7. Mantis startup and shutdown has been modified to improve cooperation with Aalchemy SwapLock to reduce the occurance of application lock-ups caused by SwapLock termination.
8. MantisClient now creates a statistics log when statistics level seven (7) is enabled. The output format is similar to the server statistics log except that some columns are set to zero. The output file, as for the server statistics log, is written to "c:\" with a date and time stamp included in the file name. This feature is for debugging by Quantum3D and is not expected to be useful to most customers.
9. Clouds no longer show a "horizon band" when the eyepoint is within the cloud.

10. Cloud scud has changed to a more realistic model. Some changes to scud settings may be required to achieve the desired affect.
11. A culling problem was fixed that was causing polygons that should be culled to be passed to the OpenGL driver under certain conditions.
12. The igFlockOfBirdsTracker plug-in has undergone numerous fixes including a rotation axis problem and performance improvements for reduced latency. The ".cfg" configuration file now has a number of new settings that control the tracker behavior.
13. A problem with OpenFlight light-point directionality has been fixed. The OpenFlight translator has been modified to store the light-point "up" vector that is needed to properly compute angle fall-off for directional light points.
14. Fixed several problems related to using a non-rendering mission function processor (MFP) server. Specifically, intersections with external references were not always being processed correctly, resulting in a failed LOS or HAT/HOT test.
15. The MANTIS_FORCE_TEXTURE_DOWNSAMPLE environment variable was added. Set to non-negative integers force texture downsampling during debugging. Note: this currently only affects DXT compressed textures (*.dds). The defualt is zero (no downsample).
16. Improved comment parsing for TerraPage and OpenFlight models. The following comments are now accepted (not case sensitive):
    a. **vt_haloed**=<enable:bool>, enables/disables halos
    b. **power**=<power:float> (legacy – deprecated), sets light-point power (normalized)
    c. **vt_lightpower**=<power:float>, sets light-point power (normalized)
    d. **vt_colormask**=<r:bool> <g:bool> <b:bool> <b:bool>, sets light-point color masking
    e. **vt_lightgroup**=<group:int>, sets light-point group number
    f. where: <bool> is either "0", "1", "F", or "T" (not case sensitive)
17. Added support for RGBX (MCM) textures embedded in TerraPage archives. This is preliminary support and has not been tested since TerraVista cannot yet output an archive format paging sensor database.
18. Enhanced the projected-texture ownship light-lobe to reduce visual anomalies in the scene. Note: this is only recommended for use on Aalchemy platforms. Shader lights should be used for NVIDIA based platforms.

1.6.0 RC8-11 Notes

Internal releases

1.6.0 RC7 Notes

Fixes and enhancements

Mantis
=====
1. Fixed geometry problem in bow wake.
2. Fixed bow wake jitter in Detailer preview window.
3. Fixed clamping problem with vt terrains containing offsets.
4. Fixed heading problem with DiGuy.
5. Changes to crash screen so that it does not get fogged out, etc.

Known issues

1. If data sync is enabled, CIGI is frame control master and no CIGI data is coming in or playing, the rendering thread will be suspended. A workaround is to disable CIGI as the frame control master until all servers are up, then enable frame control master and start data playback.
2. This release currently limits the number of moving models participating in collisions to 5.

Considerations

1. Since the alpha value for the crash screen is now used, the host simulation must set this value appropriately. A value of 0 will result in a completely transparent crash screen and a 1.0 will result in a completely opaque crash screen. Values between 0.0 and 1.0 will result in varying degrees of transparency.
2. Due to the licensing bug fix, all unlock keys prior to RC26 will no longer be valid. Please contact Quantum3D for new unlock keys.
3. For proper operation of mission functions in Mantis in conjunction with TXP databases, all externally referenced models must be converted with the following options set in OpenFlight2VTree:
    a. “Vertex Arrays” check box checked
    b. “Rotate -90 X” check box unchecked
    c. “Rotate -90 Z” check box unchecked
4. This is an internal release only, not all changes have been fully tested.

1.6.0 RC6 Notes

Fixes and enhancements

Mantis
=====
1. Fixed the erroneous error message in RC5 (note #5)
2. Fixed a shading problem on Marine bow and stern wakes
3. Improved Marine rendering performance

1.6.0 RC5 Notes

Fixes and enhancements

Mantis
=====

1. Shader search light power can now be controlled via CIGI component control packet (see the "Shader-Based Lights" section of "Mantis_CIGI_2.0_Extensions.pdf" for more information)
2. Shader light power can now be controlled via CIGI component control packet using the same mechanism as for search lights (see above).
3. DI-Guy stability has been improved. Also, characters now preload so they are immediately available after Mantis starts up.
4. A culling problem on the edge of the channel frustum has been fixed. The problem was caused by an error in the Mantis unit test itself.
5. Client configuration files (*.mpf) that contain the MarineEffects.igp plug-in can now be started from the command line without freezing MantisClient. An erroneous warning message was introduced while making this fix. The message is displayed in the MantisClient message window when a configuration file is opened after MantisClient has started.
6. A "crash on exit" problem was fixed in MantisServer.
7. A trial fix for the roll/pitch reversal problem in the igFlockOfBirds.igp head tracker plug-in is included. This fix has not been tested due to lack of test hardware.
8. The "Alloc Fail" in MantisServer was traced to a resource depletion in the NVIDIA vertex array memory caused by insufficient memory allocation. An edit field has been added to the MantisServer "General" tab for specifying the amount of video memory to reserve for vertex array storage. The default is 12.0MB, which was the previous hard-coded limit. Database developers and integrators should enable "Quiet Messages" in MantisServer to look for "Alloc Fail" messages to determine whether sufficient memory has been allocated for a specific database. All models and terrain use vertex array memory. See also #9, below.
9. The problem of missing geometry caused by the vertex array range "Alloc Fail" problem has been fixed. If video memory is exhausted a "quiet" message is issued and main memory is used for geometry vertices. Main memory is not as efficient for rendering as video memory, so this "fall back" mode can lead to suboptimal performance. See also #8, above.
10. The viXsen sensor plug-in has been upgraded to use the latest SigSim library (v 4.5.0) for improved accuracy and speed.

Known issues

1. If data sync is enabled, CIGI is frame control master and no CIGI data is coming in or playing, the rendering thread will be suspended. A workaround is to disable CIGI as the frame control master until all servers are up, then enable frame control master and start data playback.

Considerations

1. Since the alpha value for the crash screen is now used, the host simulation must set this value appropriately. A value of 0 will result in a completely transparent crash screen and a 1.0 will result in a completely opaque crash screen. Values between 0.0 and 1.0 will result in varying degrees of transparency.
2. Due to the licensing bug fix, all unlock keys prior to RC26 will no longer be valid. Please contact Quantum3D for new unlock keys.
3. For proper operation of mission functions in Mantis in conjunction with TXP databases, all externally referenced models must be converted with the following options set in OpenFlight2VTree:
   "Vertex Arrays" check box checked
   "Rotate -90 X" check box unchecked
   "Rotate -90 Z" check box unchecked

1.6.0 RC4 Notes

Fixes and enhancements

Mantis
=====

1. Updated DIS plug-in code for use with new frame control logic.
2. Added SyncDataAsync() and SyncDataAsyncComplete() methods to the igFrameControl class.
3. On AAlchemy added new sky model skirt dithering technique using an additive dithering texture, must use SimGL v340. Uses dither.rgb as the dither texture for skirt dithering, if it cannot be found, one is generated on the fly and warning messages are displayed. If sky model skirt dithering is not desired, there is an environment variable: MANTIS_DISABLE_SKIRT_DITHERING which if set to 1 will disable dithering.
4. Planetary magnitudes are now calculated, and venus and mars are added to the list of stars to render. The star field is now oriented properly and rotates properly with respect to the viewer's lat/lon and time.
5. Fixed a problem with articulated model parts that occurred when a rate was commanded before the position was initialized. Required initializing the time stamp when rate command is given.
6. Fixed reversed rotations being applied to light lobes from the channel orientation angles. Caused the light lobe texture to be projected incorrectly on some of the channels.
7. Fixed a crash bug in which vtEntity objects that are part of an fx (like rotor wash, boat wake and rotor wake) were being deleted from the scene in the comm thread, added an fx to delete list for deleting these fx's in the graphics thread.
8. Added a new member to igHostGraphicsServer (m_SyncedDataSyncTime) that holds the data sync time for the currently rendering frame. Clients should use the SyncedDataSyncTime() method instead of DataSyncTime() to get the frame data sync time. The returned time is still in client time base.

9. Changed sky model visual data for sun angles between -10 and -90 to black.
10. Changed how CIGI View Control information was applied to a view group and initialized view control data, fixed random bug where the channel view information could be set incorrectly.
11. Set the cloud interior and cloud polygon coefficients to 0.0 for twilight and night so that the clouds go black as does the sky, etc.
12. Interpolate the cloud fog color so that transitions into and out of the cloud layer look correct, otherwise in situations like dusk and dawn when the sun diffuse color is predominantly red, the upper and lower deck colors will be reddish, but the interior cloud fog color will be grayish and a stark difference will be evident during transitions into and out of the layer
13. Changed how the coloring of the lower cloud deck of the lowest cloud layer was being handled, this lower cloud deck of the lowest cloud layer was the only cloud deck being colored reddish at dusk and dawn, made the upper and lower cloud deck colors the same, this means that at dusk and dawn these deck colors will be the same, reddish.
14. Fixed two problems in projected light lobe: Disabled light-lobe pattern when the lobe would be "back projected" onto the display. Changed the minification filter on lobe pattern textures to "Nearest" to fix an edge filtering anomaly, indicated by a "streak" of light located about 90 degrees on either side of the lobe direction.

VTree
=====

1. Updated some of the special fx to better match effects with nvg light point representation.
2. Added support to vtSpliceTree for light power checking and editing. Light power is currently only used for haloed lights.
3. Fixed a bug in Audition message box that was causing dialog thread contention crash, and increased maximum number of message lines to 5000.
4. Fixed bug where textures with borders were not being downloaded correctly. The border size was being added twice.
5. Fixed bug where the vtTerrain pointer was not being put into the vtGridCache upon successful intersection in vtPolyTerrain::QueryAGNodeTriPrim.

Known issues

1. If data sync is enabled, CIGI is frame control master and no CIGI data is coming in or playing, the rendering thread will be suspended. A workaround is to disable CIGI as the frame control master until all servers are up, then enable frame control master and start data playback.

Considerations

1. Since the alpha value for the crash screen is now used, the host simulation must set this value appropriately. A value of 0 will result in a completely transparent crash screen and a 1.0 will result in a completely opaque crash screen. Values between

0.0 and 1.0 will result in varying degrees of transparency.
2. Due to the licensing bug fix, all unlock keys prior to RC26 will no longer be valid. Please contact Quantum3D for new unlock keys.
3. For proper operation of mission functions in Mantis in conjunction with TXP databases, all externally referenced models must be converted with the following options set in OpenFlight2VTree:
   "Vertex Arrays" check box checked
   "Rotate -90 X" check box unchecked
   "Rotate -90 Z" check box unchecked

1.6.0 RC3 Notes

Fixes and enhancements

Mantis
=====
1. Changed to update the DiGuy times during the FX Update method rather than a callback during rendering an empty entity at the head of the rendering list. Also updated to use the new 5.0.15 version of DI-Guy which can draw characters one at a time.
2. Added CIGI controls for city, moon, sun horizon glow intensity. Updated city glow with visibility.
3. Changed session id to remote id for lightning strike, LOS isector, etc. reporting.
4. Added round-robin assignment of collision sessions for segments.
5. Implemented pause, stop, and restart of current action for DiGuy plug-in.
6. Fixed bug in CIGI plug-in which caused the ownship to be unloaded if an fx attached to the ownship was unloaded.
7. Added logic to reinitialize tracker on shutdown.
8. Fixed bug in CIGI→VTree coord conversion for lightpoint tracer fx.
9. Fixed several bugs in lightpoint tracer fx. Now you can adjust velocity w/o stopping the effect. Effect now properly rotates with parent.
10. Sped up DiGuy performance by discontinuing use of glPushAttribute with just about every attribute.
11. Fixed bug in DiGuy to work even if ch47 character is not present.
12. Fixed bug in DiGuy plug-in so that it does not delete the sceneload tab when the plug-in is unloaded from the client.
13. Fixed bug where models with haloed light points were not getting flag set to designate such. In this case, the lights were not appearing beyond the far clip plane that is desired for NVG.
14. Changed render order of star field to be first.
15. Added support for two frame control objects, one which supports frame synchronization and one which does not, this allows all channels to be data synched, but provides a separate group of channels to not be in the frame sync group.
16. Removed instataneous frame rate display from status display and added moving average filter to compute frame rate.

VTree
=====

1. Textures are now referred to by pointer rather than by index. This gets rid of the need to lookup the texture pointer in a map in the render context everytime you only have an index and need the pointer.
2. Added BytesPerComponent() method to make it possible for higher component resolution textures to be defined correctly. Currently, only vtImageSGI uses it. Also, there are a number of methods, such as MakeGrey(), that need to be updated to use the number of bytes per component.
3. Fixed Aalchemy bug where when far clip was less than 50k dbu, range finder would return a no result and haloed light points(in viXsen) would not be visible. Instead the test will clamps based on the far clip (yon) and a scale factor that seemed to work on Aalchemy.
4. Updated rendering mode to render geometry with light point when effect visibility is reduced due to fog.
5. Fixed a bug causing texture memory usage to be incorrectly computed. Transient texture memory was not be subtracted when textures were removed.
6. Fixed a bug in vtTerraPage with halo visibility for light-points in externally referenced models. Externally referenced models containing haloed light points are now duplicated instead of instanced in the database. This may be a performance problem for some databases with many instances of a complex model having haloed light points.
7. Added Reinitialize method to devices.
8. Updated light point representation logic for fx in nvg mode to attempt to match size and position of fx geometry.

Known issues

1. If data sync is enabled, CIGI is frame control master and no CIGI data is coming in or playing, the rendering thread will be suspended. A workaround is to disable CIGI as the frame control master until all servers are up, then enable frame control master and start data playback.
2. There is GUI bug on the Channels/Layout tab with Frame Sync check box, it's status is only being read when an .mpf file is loaded. A workaround is to update this checkbox for the current .mpf, save the file, exit MantisClient, restart MantisClient and reload the .mpf. Will be fixed in next release.

Considerations

1. Since the alpha value for the crash screen is now used, the host simulation must set this value appropriately. A value of 0 will result in a completely transparent crash screen and a 1.0 will result in a completely opaque crash screen. Values between 0.0 and 1.0 will result in varying degrees of transparency.
2. Due to the licensing bug fix, all unlock keys prior to RC26 will no longer be valid. Please contact Quantum3D for new unlock keys.
3. For proper operation of mission functions in Mantis in conjunction with TXP

databases, all externally referenced models must be converted with the following options set in OpenFlight2VTree:

"Vertex Arrays" check box checked
"Rotate -90 X" check box unchecked
"Rotate -90 Z" check box unchecked

1.6.0 Notes

Fixes and enhancements

Mantis
=====

1. Changed location of BDI patch to extend timeout for DI-Guy plug-in.
2. Various fixes to improve functionality and reliability of MarineEffects plug-in.
3. Modified DI-Guy plug-in to handle generic DI-Guy characters, actions, and appearances.
4. Updated OceanBuilder.exe to more robust, changed icon, fixed various bugs, added additional messages and message boxes.
5. Added support for per-texel mission functions.
6. Modified the CIGI V2 plug-in code to better handle the situation in which the nVSync frame interrupt is not working properly, this can happen when the nVSync cable from the Mallard card to the Merlin is unplugged.
7. Made all references to DI-Guy that customer will see be consistent spelling and case with how the DI-Guy product name appears.
8. Modified DiGuy plug-in to make sure that a DiGuy isn't created for the template in the server.
9. Fixed several bugs in DiGuy plug-in:
    a) character position no longer moves when walking (will be done by host)
    b) no longer call BDI to create a guy for the template effect
    c) patched so that appearance will be maintained (was changing back to default appearance seemingly randomly).
    d) appearance is now set when the character is defined, not later to potentially cause the default appearance not to be loaded if not needed.
    e) component state is now used when setting an action to tell whether or not it should transition smoothly or happen immediately.
10. The starfield no longer gets recreated everytime the far clipping plane changes. It is created once, and uses the new ability to turn off depth buffer writes in RS nodes to avoid having to move with the clipping planes.
11. Changed location of BDI patch to extend timeout for DI-Guy.
12. Changed the frame control class so that information about the syncs for each session are now monitored, provides information on sessions that are no longer responding

VTree
=====

1. Optimization for HAT requests over AGNodes with triangle primitives.

2. Modified image and isector classes to provide per-texel data support for mission functions required in Mantis.
3. Fixed a bug that was preventing detail texture on TerraPage tiles from appearing correctly. This was a problem when the base texture was a "local texture" and the detail texture was an "external" texture.
4. Depth buffer write state is now part of the state controllable in an RS node.
5. Depth buffer write state controls added were added to render context classes.
6. Fixed bug in vtLight in which display lists were being created every render frame.

Known issues

1. If data sync is enabled, CIGI is frame control master and no CIGI data is coming in or playing, the rendering thread will be suspended. A workaround is to disable CIGI as the frame control master until all servers are up, then enable frame control master and start data playback.

Considerations

1. Since the alpha value for the crash screen is now used, the host simulation must set this value appropriately. A value of 0 will result in a completely transparent crash screen and a 1.0 will result in a completely opaque crash screen. Values between 0.0 and 1.0 will result in varying degrees of transparency.
2. Due to the licensing bug fix, all unlock keys prior to RC26 will no longer be valid. Please contact Quantum3D for new unlock keys.
3. For proper operation of mission functions in Mantis in conjunction with TXP databases, all externally referenced models must be converted with the following options set in OpenFlight2VTree:
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   “Rotate -90 X” check box unchecked
   “Rotate -90 Z” check box unchecked

1.5.4 Notes

Fixes and enhancements

Mantis
=====

1. Added limit checking for opacity (0 - 100) and RVR (0 - general visibility) for CIGI weather packet. Also increased the max incloud visibility to 10000 for 0% opacity.
2. Added check for changing sky model data to force cloud color update.

VTree
=====

1. Updated FX haloed lights to prevent far visibility plane clipping.

Known issues

1. If data sync is enabled, CIGI is frame control master and no CIGI data is coming in or playing, the rendering thread will be suspended. A workaround is to disable CIGI as the frame control master until all servers are up, then enable frame control master and start data playback.

Considerations

1. Since the alpha value for the crash screen is now used, the host simulation must set this value appropriately. A value of 0 will result in a completely transparent crash screen and a 1.0 will result in a completely opaque crash screen. Values between 0.0 and 1.0 will result in varying degrees of transparency.
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   "Rotate -90 X" check box unchecked
   "Rotate -90 Z" check box unchecked

1.5.3 Notes

Fixes and enhancements

Mantis
=====

1. Fixed frame delay bug when transitioning from cloud transition band to inside cloud, caused momentary glitch, added code to explicitly sync the fog density.

VTree
=====

1. Rearranged vendor and renderer determination code so that glHint's for specific renderers such as Aalchemy work correctly when initializing the render context.
2. Added check in the Define() method to make sure that only one thread at any given time can define a texture, was causing a crash when ViXsen was updating textures and TXP was paging.

Known issues

1. If data sync is enabled, CIGI is frame control master and no CIGI data is coming in or playing, the rendering thread will be suspended. A workaround is to disable CIGI as the frame control master until all servers are up, then enable frame control master and start data playback.

Considerations

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   "Rotate -90 Z" check box unchecked

1.5.2 Notes

Fixes and enhancements

Mantis
=====

1. Updated OpenFlight2VTree converter to use referenced texture when the override option is selected and the specified override texture cannot be found.
2. Updated calibrate routine so that it can be issued in the same frame as the head tracker enable.
3. Added utilities directory to Mantis installation containing utilities for compressing textures.

VTree
=====

1. Added glHint for Aalchemy to eliminate need to specify the environment variable SGL_ENV_HINT_TXR_REDUCTION_NICEST.
2. Modified missile trail special effect so that the effect renders from the starting location instead of waiting until the second node is added after the first node add interval time period elapses
3. Added reference counting to m_Halos list objects, fixed problem when light points on TXP terrain paged in and out.
4. Added synchonized mode for Fastrak to video sync.
5. Added locks to the multitexture unit for light lobes, fixes problem when a detail texture on a polygon under AAlchemy (2 TMUs) is competing for the second texture unit with the light lobe object and it's detail texture.
6. Fixed bug in which the texture matrix was not being restored in the light lobe post render method.

Known issues

2. If data sync is enabled, CIGI is frame control master and no CIGI data is coming in or playing, the rendering thread will be suspended. A workaround is to disable CIGI as the frame control master until all servers are up, then enable frame control master and start data playback.
3. Sometimes when changing TXP sensor databases, the TXP thread will crash in MantisServer. This problem is being investigated.

Considerations

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   “Rotate -90 Z” check box unchecked

1.5.1 Notes

Fixes and enhancements

Mantis
=====

1. Fixed resource leak in ServerMon.
2. Increased default monitor timeout in ServerMon from 2 sec. to 30 sec.
3. Added additional thunderstorm models with increasingly darker textures.
4. Updated error message in Python interface.
5. In MantisClient added check for nVSync enable and code to reset flag if nVSync is not available on hardware. This would happen if an mpf file created on IDX, but then used on non-nVSync capable hardware.
6. Fixed bug in MantisClient in which the monitor refresh value was not being updated and sent to all servers.
7. Modified the entity unload code so that all attached models are also removed from the entity list (per the CIGI spec), also all entities and effects attached to these removed entitie(s) are also removed, etc. etc.
8. Added hemisphere and debug configuration options, changed thread update rate to 1 ms to allow high resolution timer in vtDevFastrak to be utilized instead of vtWait.
9. Fixed ref/unref problem in cluster effects processing.
10. Modifed the CIGI entity control processing to allow for special effects to be reparented and for the special effects state processing to be more consistent with the CIGI specification.
11. Changed calls to GetHazeColor and CloudFogColor so that they use the proper band so that transition into clouds looks right when using sensors.
12. Fixed bug in which the scene list for collision volume detection was not being updated on mission function computer.
13. Fixed bug in Detailer in which special effects could only imported if a plug-in was loaded.
14. Added nVSync specific timing to sync log.
15. Increased max rate for snow from 100 mm/hr to 250 mm/hr.
16. Fixed bug with light lobes on cultural models with detail textures, light lobe and detail texture were getting confused.
17. A new SimGL v339 driver is now located in the \mantis\drivers\Win2K\Quantum3D\AAlchemy\simGL directory, this driver no longer requires the environment variable SGL_SSE = 0 to be defined for the light lobes to work properly. This environment variable should be removed if it is defined.

VTree
=====

1. Fixed bug in rgb2bmp.exe when converting rgb textures with alpha channel.
2. Updated UUID determination code, fixes problems of changing UUID depending on network connection, installation of services such as RAS, NetBios availability, etc.
3. Updated return code to return TRUE for fx when trying to start an fx already

running, stopping an fx already stopped, etc., eliminates erroneous error message(s).
4. Integrate latest trPage library code from Terrex.
5. Fixed bug that was causing VT_LIGHTGROUP comments in the hierarchy to be ignored for external references. The fix requires that external references containing light-points or potentially luminous polygons to be re-read from disk each time instead of cacheing after the first reference. So there is a performance penalty at translation time, but there should be no penalty at run-time.
6. Fixed bug in which missile trail texture coordinates were not being scaled correctly so as to keep the texture coordinates within the nominal texture coordinate range.
7. The #2 and #3 buttons were reversed in the vtJoy object in the vtDev library.
8. Made steps to fix a bug where RSNode texture state changes were being overridden during AGNode rendering.
9. Fixed bug in which vertex array information was being utilized on non-AAlchemy hardware, this was okay if the hardware was nVidia based, but some hardware (including the Microsoft software only OpenGL) would crash, so the use of vertex array information is now specific to nVidia based hardware.
10. Added hemisphere and debug options to sixdof/Fastrak. Updated Fastrak binary mode to reduce jitter effects.
11. Added support for haloes, power, and colormasks for light point nodes in similar comment fashion as openflight loader. Light groups specified by comment will override ones specified via CalligraphicDrawOrder.

Known issues

1. If data sync is enabled, CIGI is frame control master and no CIGI data is coming in or playing, the rendering thread will be suspended. A workaround is to disable CIGI as the frame control master until all servers are up, then enable frame control master and start data playback.
2. Sometimes when changing TXP sensor databases, the TXP thread will crash in MantisServer. This problem is being investigated.

Considerations

1. Since the alpha value for the crash screen is now used, the host simulation must set this value appropriately. A value of 0 will result in a completely transparent crash screen and a 1.0 will result in a completely opaque crash screen. Values between 0.0 and 1.0 will result in varying degrees of transparency.
2. Due to the licensing bug fix, all unlock keys prior to RC26 will no longer be valid. Please contact Quantum3D for new unlock keys.
3. For proper operation of mission functions in Mantis in conjunction with TXP databases, all externally referenced models must be converted with the following options set in OpenFlight2VTree:
   "Vertex Arrays" check box checked
   "Rotate -90 X" check box unchecked
   "Rotate -90 Z" check box unchecked

1.5.0 Notes

Fixes and enhancements

Mantis
=====

1. Updated version string, replaced RC with Build.
2. Alpha value from component control packet for screen blanking was not being passed into the igColor constructor, therefore alpha had no effect. There was another related bug fixed in igHostScene.cpp, When the screen blanking entity was created, it was not set to be depth sorted. That was fixed also.
3. Fixed CIGI reset bug. When processing 'lots' of intersections and collisions, and a reset was attempted, CIGI went to standby, but never back to operate. The fix for this was, when a CIGI standby command is received, the current intersection and collision enables are stored, then intersection testing and collision detection is disabled. Once other standby code has executed, the previous states are restored.
4. Made MantisClient GUI window non-sizable.
5. Added support for new shader component control packet.
6. Fixed initialization bug in copy constructor of vtFxLightPointTracer and also fixed problem that caused the 2nd tracer fired to be delayed.
7. Added code to call nVSync shutdown only if nVSync is currently active and added message string to indicate when Init() and Shutdown() are called.
8. Increased maximum number of non-ownship collision models allowed from 3 to 5.
9. Fixed bug in which attached models might be updated before they were successfully attached, and then never updated again.
10. Performance fixes for sky model to limit UpdateModel frequency, use RS node to set star colors, use AG node for stars.
11. Updated code to allow selection of 0 target frame rate to disable sync to Vsync on servers.
12. Changed SyncSetDirty to QueuedSyncSetDirty. Improved performance by using STL collections a bit differently than before (during cleaning).
13. Fixed a performance problem caused by making CIGI entities dead-reckoned when only an attached part should be dead reckoned.
14. Quantized fog color data to reduce the frequency of sync calls.
15. Added command line option for setting the cache folder.
16. Fixed bug by modifying the DefineTerrain method to set the 'is terrain' flag to TRUE when creating a terrain. This is so the server can allow segment collisions with the terrain even though it is marked as NOT collidable. (Terrains were always being marked as collidable. This caused us to traverse the scenegraph of the terrain for volume collisions, which is bad. Now we mark the terrain as NOT collidable, but set the 'is terrain' flag to true. This allows the server to always allow segment collisions on the terrain, regardless of the collidable flag.)
17. Added stats for: data sync time, clean time, mission function time, volume collision time, and pre-swap time.

18. Optimized igHostGraphicsServer::RenderScenes method by moving some loops outside of the loop through all windows.
19. Added support for IR/Visual band lights to lights in Mantis.
20. Updated ServerMon functionality, timeout value is used to determine when the running MantisServer should be terminated and re-started due to non-incrementing heartbeat. This means that the timeout value should be increased to a larger value, on the order from 30 to 60 seconds. This value is not used to determine when to initially start MantisServer. ServerMon now starts MantisServer as soon as it detects no MantisServer running.

VTree
=====

1. Locked the blend function during shader light passes.
2. Added a lock to the blend functions.
3. Fixed bug when using compressed detail textures that could cause a crash.
4. Commented out check for GL_Q3DSGL_texture_3df extension in _read_3df(), prevented OpenFlight2VTree to run properly when creating a model with txs textures on an nVidia machine for use on an AAlchemy machine.
5. Added additional check for txs and/or dds in texture list added by code in LoadImage() to load txs or dds texture if present and specified texture not found.
6. Modified vtTexture::MemoryUsage to just return the image data size instead of computing using width, height, etc. The original computation was badly in error because of hardware texture compression (DXT, FXT).
7. Fixed bug where light-point representation was not being copied correctly in the copy constructor or assignment operator. This would have caused a memory leak and/or a missing light-point node for the effect.
8. Fixed bug in vtTraverser::TraverseDepthFirst that was causing the traversal state to be incorrect.
9. Fixed bug in vtOpenFlight due to conversion of GNodes to AGNodes where instanced geometry was being converted, added RefsToNode() method to update tree and replace nodes.
10. Extended the IR/Visual light waveband flag to work under non-shader implementations.
11. In Audition and vtSpliceTree, made mouse model relative to cursor position when left or right mouse button is pressed.
12. Fixed bug in vtTerraPage in which textures were not being freed, but were in the textures to delete list, added code to check for any pending textures for deletion even if no terrain is currently loaded or being loaded.

Known issues

1. If data sync is enabled, CIGI is frame control master and no CIGI data is coming in or playing, the rendering thread will be suspended. A workaround is to disable CIGI as the frame control master until all servers are up, then enable frame control master and start data playback.
2. Importing special effects into Detailer does not work properly.

Considerations

1. Since the alpha value for the crash screen is now used, the host simulation must set this value appropriately. A value of 0 will result in a completely transparent crash screen and a 1.0 will result in a completely opaque crash screen. Values between 0.0 and 1.0 will result in varying degrees of transparency.
2. Due to the licensing bug fix, all unlock keys prior to RC26 will no longer be valid. Please contact Quantum3D for new unlock keys.
3. For proper operation of mission functions in Mantis in conjunction with TXP databases, all externally referenced models must be converted with the following options set in OpenFlight2VTree:
    i. "Vertex Arrays" check box checked
    "Rotate -90 X" check box unchecked
    "Rotate -90 Z" check box unchecked

1.5.0 RC27 Notes

Fixes and enhancements

Mantis
=====

1. Added material pre-definition callbacks to intercept the creation of new materials as they are added to the texture list. 2 texture lighting and pre-computed radiance modes have expectations for the materials used so the materials can be correctly "modified" as they are added with this callback functionality.
2. Made intensity range for all CIGI Component Controls consistent with range of 0.0 - 100.0, specifically sky model: ambient light and horizon glow intensity, light lobe intensity.
3. Added methods to provide descriptive CIGI Component Control ASCII dumps for extensions supported in Mantis.
4. Fixed a bug where the terrain model was not getting assigned a collision session ID. This caused the terrain to be marked as not collidable.
5. Fixed bug causing moon position to move drastically, found to be a rollover issue in the Zulu time since midnight, sensitive to longitude position.
6. Made the render window wireframe toolbar button a pushbutton in Detailer.
7. Fixed SetPlacement() method to allow ocean clamp of stopped vessel.
8. Fixed bug toggling the wireframe mode in Detailer render window, conflict found between toolbar and model properties.
9. City glow logic updated for improved performance.
10. Fixed bug in Detailer in which the special fx parent entity was not visible, which resulted in the need for a model to be loaded to see the special fx.
11. Fixed bug where Detailer would crash trying to load plug-ins that were no longer there.
12. Moved citylights logic to server side.

13. Lowered horizon on moon/city glow NVG skirt.
14. Added logic for head tracker enable/disable.
15. Fixed timing issue with turning off AGC for Sensor Effects by stopping the AGC Update thread when the Level is disabled.
16. Added code to find and terminate hung MantisServer apps.
17. Added callback hooks for the search light implementation.
18. New light maps.
19. Added support for resource version information to be displayed in About Box, this version information must be updated before each release and the application recompiled.
20. Fix ocean lighting, transparency.
21. Add ocean material.
22. Fixed bug which was causing environment visibility to override the visibility set by the viXsen Atmoshpere tab on an Alchemy (non-NVidia GForce 4).
23. Disabled VTree statistics collection for statistics level 1.
24. Add sea state and whitecaps to Marine Effects plug-in.
25. Now passing the resolved entity id (as an (igBase *)) to the Notify function for packet handler plug-ins.
26. Reset the IR sky data similar to NVG so that viXsen can determine the proper sky colors while it renders.
27. Changed default mode to continuous for the Polhemus tracker.
28. Added configuration file selection for return mode (ascii or binary) and request mode (polled or continuous) for Polhemus tracker.

VTree
=====

1. Updated load context with Txp entity render context when loading externally referenced models in vtTerraPage.
2. Added call to flag and generate descendant batch information based on load context enable, done at end of vtReadWrite.
3. Added check to not process display lists in GNodes and AGNodes if descendant batch generation in progress.
4. Added a 'band' to vtLight.
5. Eliminated unneeded LazyStateCleanup calls (when possible).
6. vtOpenGLRenderContext mods affected the light shader. The context will only trace the material shader data when specifically requested.
7. Now tracing GL_BLEND and the light shader request for material properties.
8. Attempting to elminate some OpenGL based overhead: modified a LoadMatrix call now tracing GL_BLEND state slight reorganization of the bind for multitexture limited shader request on material.
9. Combined TerraPage materials with identical properties. TerraPage archives have many many materials with different IDs but the same properties. This was causing VTree to create many many materials, and was causing grief in viXsen as well.
10. Updated code to use inLoadRange for determining when to load TXP tiles and use inRange to determine when to add/remove tile geometry from scene graph. This fix needs to be thoroughly tested.

11. Fixed problems with embedding txs textures in .vt models using the OpenFlight2VTree utility.
12. Added check for dds and txs file existance in LoadImage() for the case when the referenced texture cannot be found and try to load dds or txs texture instead.
13. Added support for overriding the texture type in the OpenFlight loader, supported types are dds and txs.
14. Fixed bug in OpenFlight2Vtree library in which conversion of GNodes to AGNodes and the call to FlagDescendantBatchCandidates() was happening for each external reference, instead of once after the entire model specified by the master .flt file was processed.
15. Fixed bug in vtOpenFlight::LoadTexture() which returned a NULL texture reference if a texture was not in the local texture list but was in the global VTree texture list, now if such a case occurs a new entry is added to the local texture list.
16. Fixed bug in which m_MultiTexture[0] was being referenced an extra time in the vtAGNode::Read() method, also made some formatting changes.
17. Fixed bug which caused Audition to crash by adding check for NULL shared.entity pointer in ToggleModelDLUsage() and ToggleModelVARangeUsage().
18. Fixed bug which sometimes resulted in the same texture being added to the texture list multiple times by adding a search for textures with .txs and .dds extensions that may have been added by code in vtImageBase::LoadImage() which uses txs or dds texture if the specified texture could not be found.
19. Updated shader support in vtScene and vtLight to support ViXsen.
20. Fixed mipmap level problem with txs textures that caused black artifacts on the horizon or in the lower mip levels for databases.
21. Added support for descdendant batch processing, a type of global or large display list, to improve render performance.

Known issues

7. If data sync is enabled, CIGI is frame control master and no CIGI data is coming in or playing, the rendering thread will be suspended. A workaround is to disable CIGI as the frame control master until all servers are up, then enable frame control master and start data playback.

1.5.0 RC26 Notes

Fixes and enhancements

Mantis
=====
1. Fixed bug in licensing.

1.5.0 RC25 Notes

Fixes and enhancements

Mantis
=====

1. Fixed Mantis Client crash when final channel deleted. This bug was introduced by me when I fixed the bug causing the Channel GUI to get confused whilst deleting channels. I verified that this fix didn't undo that fix.
2. Added support for Dynamic Anti-Aliasing control on IDX.
3. Changed/added code to only update the near/far clip settings for the channel property list when these values are changed on the gui. Was causing sluggish response on GUI when changing values.
4. Fixed inconsistent slider control for time of day.
5. Fixed bug when determining file extension for files containing extra periods ('.').
6. Changed SetTextureFile so that it uses the CachePath instead of the AbsolutePath of the filename (like other effects) since viXsen only overrides the CachePath with the .mcm file name.
7. Adjusted precipitation color based on fog, for the cases in which fog was enabled.
8. Modified CIGI log playback code to improve realtime playback, added code to ignore StartOfFrame packets in CIGI logs (may not be necessary in conjunction with other changes).
9. Prevented database origin offsets from affecting models that were attached to other models.
10. Fixed black fog bug. Grayscale was being computed and applied to clouds and fog, but should only be applied to clouds.

VTree
=====

1. Fixed multi-texture and alpha bugs
2. Fixed problems with mipmaps in FXT1 embedded textures.
3. Removed color attenuation for light intensity fade on falloff for angle.
4. Fixed falloff exponent comment.
5. Added motion to precipitation based on the rotation of the viewer.

Known issues

1. If data sync is enabled, CIGI is frame control master and no CIGI data is coming in or playing, the rendering thread will be suspended. A workaround is to disable CIGI as the frame control master until all servers are up, then enable frame control master and start data playback.

1.5.0 RC24 Notes

Fixes and enhancements

Mantis
=====

1. Modified code to reduce the chances of UDP getting out of sync. UDP was not necessarily keeping message from being fragmented as well as it could.
2. Updated ViXsen data files.
3. Added status list box to ServerMon, used to detail activities.
4. Updated code to default to Exponential type fog. Fog type of None has been removed.
5. Limited part map warning message to 1 Hz, usually occurs when the wrong model is being utilized.
6. Fixed bug when specifying 0 coverage for cloud layer, cloud was being turned off properly but Mantis was still trying to load this non-existent texture.
7. Added licensing to FlockOfBirds tracker plug-in as subproduct to Mantis server.
8. Added licensing to PolhemuFastrak tracker plug-in as subproduct to Mantis server.
9. Added support for range based fog, valid only on nVidia/IDX.
10. Fix for alpha testing settings affecting the moon visual.
11. Fixed bug when counting responses from servers during async startup.

VTree
=====

1. Fixed problem with lower level mipmaps for FXT compressed textures that caused black artifacts in textures, especially toward horizon in databases.
2. Fixed multi-texture problem with OpenFlight objects (which are in the same object or group) with different texture attributes from converting correctly. This includes objects with detail texture.
3. Fixed bug in code used to determine if a texture has transparency during OpenFlight to VTree conversion.
4. Fixed bug in OpenFlight library when handling special model conversion directive comments, e.g. carriage-returns were not being handled.

Known issues

1. If data sync is enabled, CIGI is frame control master and no CIGI data is coming in or playing, the rendering thread will be suspended. A workaround is to disable CIGI as the frame control master until all servers are up, then enable frame control master and start data playback.

1.5.0 RC23 Notes

Fixes and enhancements

Mantis
=====
1. Updated code to detect changes and ask user to apply changes if different tab is selected.
2. Lighting model changed slightly. Modulation from moon angle in the sky removed, ambient lighting issues fixed.
3. Moon size adjusted to match the subjectively sized sun.
4. Fixed GUI bug when deleting channels, server name box got confused.
5. Fixed bug in which the environment visibility was not be saved properly.

VTree
=====
1. N/A.

Known issues

1. If data sync is enabled, CIGI is frame control master and no CIGI data is coming in or playing, the rendering thread will be suspended. A workaround is to disable CIGI as the frame control master until all servers are up, then enable frame control master and start data playback.

1.5.0 RC22 Notes

Fixes and enhancements

Mantis
=====
1. In ViXsen, increased moon power to 1e35 to make it show up as a large haloed lightpoint.
2. Updated logic to add haloed flag to entities containing fx with light point representations so entities will not be culled out of scene due to range.
3. Attempted to fix a visibility contention between the client and viXsen. Fixed material binding override problem for precomputed and 2 texture lighting. Increased moon light power to match halo lightpoint node changes.
4. Updated with city glow and Polhemus packets.
5. Moved horizon glow packet to environment type from sensor type.
6. Changed location of config file to server executable directory.
7. Added CIGI Horizon Glow Intensity Control for NVG moonglow and cityglow effects.
8. Updates to add filtering and sync options to Fastrack head tracker.
9. Updates to enable entities with haloed lights to bypass far culling tests to allow lights to show up at far ranges.
10. Corrected skirt illumination bug.

11. Updates to add filtering and sync options for Polhemus head tracker.
12. Added message when material response textures finish loading into texture memory.
13. Removed license check for ViXsen subproduct on MantisClient machine.

VTree
=====

1. Added support for MCM texture references. Currently they exist as a second table and are now referenced if the render context is doing any MCM processing. MCM textures are currently only supported externally by Terrex.
2. Updates to light point representation for effects.
3. Updated effects so light point representation not used in visual channels.
4. Updated logic to add light point node for effects.
5. Updated Effects to add light point representation to give visibility at far ranges.
6. Modified halo rendering to account for range, power and atmosphere variations. Improved model will yield visibilities over 100km beyond far clip even. Intensity scale factor can linearly reduce the halo output, but power is in a logarithmic scale for increase or decrease.
7. Updated Aalchemy logic with far threshold logic so that far away entities will still pass occulting test even when beyond sky skirt range.
8. Added informational message that indicates successful initialization.
9. Updated SimGL header to handle proper depth buffer reads for haloed lightpoints.
10. Updates to improve Polhemus Fastrak performance by utilizing continuous mode and binary formats for return data. Added support for filtering and sync options.
11. Updates for F15-C NVG Light Point Processing.
12. Haloed Light Optimizations.
13. Far culling adjustment to keep lights in scene at far distances.

Known issues

1. If data sync is enabled, CIGI is frame control master and no CIGI data is coming in or playing, the rendering thread will be suspended. A workaround is to disable CIGI as the frame control master until all servers are up, then enable frame control master and start data playback.
2. Culling problem with SimGL 328 and SimGL 331 in conjunction with TXP databases containing light points, culling appears to work correctly with earlier versions of SimGL such as version 326.

1.5.0 RC21 Notes

Fixes and enhancements

Mantis
=====

1. Fixed TXP terrain startup problem which caused occasional crash during startup.
2. Doubled the size of the sun model.

3. Removed lock that caused the nVSync PreSwap to wait for FrameInterrupt to complete.
4. Modified CIGI sender thread code to break up packets into multiple messages if exceed 2K buffer size.
5. Fixed a bug caused by the addition of support for Creator's inhibit day/dusk/night capability. The VTree implementation inserts a switch node that's sensitive to time of day when this flag is used. This 'special' switch was causing problems for SCD. Fix was to ignore switch nodes of this type when initially parsing the scene graph, so they never make it into the SCD info.
6. Added non-environmental fog from effects like thunderstorms and cloud layers.
7. Fixed lightpoint sorting problem within OpenFlight objects in OpenFlight2VTree.

VTree
=====

1. Added support/dialog for the inhibit day/dusk/night flags to vtSpliceTree.
2. Fixed MakeBNodeGeometryWireframe function in vtSpliceTree to account for AGNodes as well as GNodes.

Known issues

1. If data sync is enabled, CIGI is frame control master and no CIGI data is coming in or playing, the rendering thread will be suspended. A workaround is to disable CIGI as the frame control master until all servers are up, then enable frame control master and start data playback.

1.5.0 RC20 Notes

Fixes and enhancements

Mantis
=====

1. Fixed bug in Detailer which prevented CIGI switch id’s from being generated when a new model was added, id’s always set to -1.
2. Fixed bug which caused ownship collisions with thunder storm model.
3. Fixed bug with moon illumination being too bright.
4. Changed light lobe behavior to be positive up and negative down.
5. Fixed bug in Detailer which caused crash on older graphics hardware which is incompatible with vertex arrays and range memory.
6. Fixed bug in which txs (3df) detail textures were not being properly bound.
7. Fixed bug in TXP loader with TXP databases using inconsistent texture filenames, prevented detail texture from being applied appropriately using cg2detail.txt.
8. Fixed bug in OpenFlight2VTree which was causing the VTree model to have a different node order than the source OpenFlight model.

Known issues

2. If data sync is enabled, CIGI is frame control master and no CIGI data is coming in or playing, the rendering thread will be suspended. A workaround is to disable CIGI as the frame control master until all servers are up, then enable frame control master and start data playback.
3. Mantis Server sometimes crashes if the startup terrain is a TXP terrain. Current solution is to startup with .vt terrain and then select TXP terrain after Mantis is up and running.

1.5.0 RC19 Notes

Fixes and enhancements

Mantis
=====

1. Added asynchronous client/server session negotiation and window/channel setup (speeds up startup time).
2. Added ability to unload Marine Fx plug-in.
3. Added environment variable list and status to MantisClient and MantisServer about boxes.
4. Fixed bug in which fx template parent was never unlocking fx list in MantisClient.
5. Fixed bug in which models could not be attached to the ownship model.
6. Fixed bug in which attached models were being deleted before their parent, in some cases causing MantisServer to crash.
7. Fixed memory leak in reliable UDP com channel in which redundant messages were not being deleted.
8. In ViXsen enabled fog for shader lighting so density gets set for proper halo rendering.
9. In ViXsen added fixed color capability and combined diffuse, specular and ambient into single vector (secondary color) from vertex shader to register combiner. Fixed skirt for nvidia.

VTree
=====

1. Added new shader light implementation.
2. Updated two texture mcm processing to use special SimGL decal texture mode, Post Add.
3. Added material binding pre and post reason callback hooks. viXsen 2 texture lighting makes use of the pre binding reason to prevent material zero binding. Instead it binds its own default material.

Known issues

1. If data sync is enabled, CIGI is frame control master and no CIGI data is coming in or playing, the rendering thread will be suspended. A workaround is to disable

CIGI as the frame control master until all servers are up, then enable frame control master and start data playback.
2. Isector processing does not work in conjunction with UDP connection, must use TCP connection.

1.5.0 RC18 Notes

Fixes and enhancements

VTree
=====
1. Added background texture download pacing to vtTerraPage loader. Controlled via environment variable on all hosts, default is: TXP_MAX_DOWNLOAD = 0.001. Pacing can be disabled by setting allowance to a negative value.

Known issues

1. If data sync is enabled, CIGI is frame control master and no CIGI data is coming in or playing, the rendering thread will be suspended. A workaround is to disable CIGI as the frame control master until all servers are up, then enable frame control master and start data playback.

1.5.0 RC17 Notes

Fixes and enhancements

Mantis
=======
1. Fixed bug in igCigi2 plug-in in which the animation script index was being incremented incorrectly when added to the model.
2. Fixed alpha test synchronization problem in cloud layers, caused alpha test parameters to affect alpha of cloud layers.
3. Fixed bug in MarineEffects plug-in (vtOcean library) in which vtAGNodes were not always being considered during intialization.
4. Modified startup timing to provide servers chance to initialize, attempt to remedy last server crash problem.

VTree
=====
1. Fixed bug in TXP loader when loading external models which caused the textures to get scrambled.
2. Modified the OpenFlight2VTree library to only load textures referenced by the geometry, instead of loading all textures referenced by the OpenFlight archive (speed optimization).
3. Fixed bug in vtCountPolys() in which vtAGNodes were not being considered,

caused Audition to show node counts of zero for models converted using vertex arrays.

Known issues

1. If data sync is enabled, CIGI is frame control master and no CIGI data is coming in or playing, the rendering thread will be suspended. A workaround is to disable CIGI as the frame control master until all servers are up, then enable frame control master and start data playback.

1.5.0 RC16 Notes

Fixes and enhancements

Mantis
=======
1. Added code to disable light lobe before deleting, kept light lobe from resetting properly.
2. Added code to disable fog lights before deleting, kept light lobes from resetting properly.
3. Fixed problem with licensing on MantisServer introduced by routine to detect rendering hardware.
4. Added support for horizon glow in NVG mode, intensity is tied to moon phase and elevation.
5. Added support for city glow, user can specify a .cty file in the Mantis cache whose name corresponds to the database filename (less extension). Example .cty file is located in the ViXsen NVG example database.
6. Added support for lighting attenuation based on CIGI cloud coverage in NVG mode.
7. In NVG mode, moon is now represented as a large haloed light point.

VTree
=====
1. Enhanced light points with halos to include range, intensity and atmosphere effects.
2. Modified support for OpenFlight comment: VTHALOED, user can optionally include “POWER=float val” to specify the intensity of the light point, if unspecified the default is 1.0.
3. Visibility test of halos now processed in round-robin fashion to increase performance, default process is 100 light points per frame.
4. Added additional performance changes using lazy state changes.
5. Added code to not update/render light points if scene time of day turns lights off.
6. Added code to support embedding .txs textures into models.

Known issues

1. If data sync is enabled, CIGI is frame control master and no CIGI data is coming in

or playing, the rendering thread will be suspended. A workaround is to disable CIGI as the frame control master until all servers are up, then enable frame control master and start data playback.

1.5.0 RC15 Notes

Fixes and enhancements

Mantis
=======

1. Added code to ServerMon to check for wedged MantisServer and terminate it.
2. Added check to Detailer to disable animation script and collision segment tabs for OpenFlight models.
3. Added metrics overlay to MantisServer controlled via render statistics.
4. Fixed bug with texture enable in which disabled textures were re-enabled by toggling the sky model.
5. Removed support for MultiView hardware synchronization from MantisServer.
6. Added nVSync availability to server response to client, enables/disables the nVSync enable checkbox.
7. Added vertex array range support to MantisServer GUI.

VTree
=====

1. Fixed bug when converting models with light points in which the bounding information was not preserved.
2. Added support for OpenFlight polygon time of day inhibit information.
3. Fixed bug with geometry meshing that generated bad geometry and/or crash.

1.5.0 RC14 Notes

Fixes and enhancements

Mantis
=====

1. Fixed problem with light points only rendering in single-pass mode
2. Added DList policy calls for new AGNode type to improve performance on Aalchemy.
3. Added 25 more attenuation maps for spotlight fx.
4. Fixed sky model horizon band to update correctly if general visibility disabled.
5. Updated Detailer to use the model properties when rendering (e.g. wireframe, depth sorted, visible, etc.)
6. Cannot reliably switch from TXP to TXP database in Mantis.
7. Reset time of day to noon upon CIGI reset.
8. Added additional material mapped textures for special effects.

VTree
=====
1. Light points in TXP databases not rendering on Aalchemy.
2. Additional optimizations added for TXP, light points, and geometry.

Known issues

1.5.0 RC13 Notes

Fixes and enhancements

Mantis
=====
1. Disabled display lists for moon.
2. Fixed problem with stars not rendering.
3. Added data files required for spotlight.
4. On new installation, only enable display lists for Aalchemy.

VTree
=====
1. Added additional Dan Bybee vtAGNode support.
2. Update Audition to use new vtAGNode type.

Known issues

1. Vertex array optimizations cause performance penalty on Aalchemy.

1.5.0 RC12 Notes

Fixes and enhancements

Mantis
=====
1. Fixed vertex array/light point crash problem.
2. Fixed collision segment isector problem in conjunction with new vertex array optimizations.
3. Restore channel settings on CIGI reset
4. Remove calls to AddrToHost name (to fix speed hit)
5. Enlarged server name combo in client channel layout gui, and added HSCROLL
6. Removed case sensitivity for host names
7. Initialize CIGI data log mode to "stopped" instead of "NoMode"
8. Modified default cloud layer color to white
9. Modified default cloud layer altitude (1000 - 2000, with 100m transition)
10. Added UDP NIC selection on Client (for broadcast interface)

VTree
=====

1. Merged Dan Bybee vtAGNode code into VTree baseline
2. Added Local/Global light selection in Audition OpenFlight options dialog
3. Added "Vertex Array" enable in Audition OpenFlight options dialog
4. Added "Vertex Array" enable in OpenFlight2VTree
5. Modified vtLightPointNode to optimize math and rendering
6. Changed vtDVector.h to use struct members instead of operator[]

Known issues

2. Star field does not seem to render since introduction of vertex array optimizations.
3. Vertex array optimizations cause performance penalty on Aalchemy.

1.5.0 RC11 Notes

Fixes and enhancements

1. Nvidia specific performance enhancements added to VTree4.
2. Marine plug-in added.
3. DiGuy plug-in added.
4. Updated network name resolution.
5. Updated defaults for CIGI playback, clouds, etc.
6. Added vtOcean to support Marine effects plug-in.
7. Created Fulcrum GUI based ServerMon.

Known issues

1. This version has performance penalty on Aalchemy.
2. Requires SimGL version 326 or better.
3. Fulcrum based ServerMon crashes when stopping monitoring.
4. Marine plug-in not licensed.
5. DiGuy plug-in not licensed.
6. This version not for general release.

1.5.0 RC10 Notes

Fixes and enhancements

1. Fixed culling problem in VTree4.
2. Some other minor performance improvements to VTree4.

1.5.0 RC9 Notes

Fixes and enhancements

1. Rebuilt Vtree4 with latest source.
2. Rebuilt Mantis with new Vtree4.

1.5.0 RC8 Notes

Fixes and enhancements

1. Fixed light lobe initialization pointer problem.
2. Updated frame control mechanism to include hardware frame synchronization control.
3. Fixed minor cleanup issues which caused crash on Independence.
4. Fixed problem in which Txp terrain databases did not restart properly when selecting between different terrain databases.
5. Fixed problem with special effects associated with entity appearance bits.
6. Fixed problem with client opening COM1 port multiple times during sync to Vsync initialization.
7. Updated model placement, rate, acceleration token synchronization.

1.5.0 RC7 Notes

Fixes and enhancements

1. Fixed reference/dereference problem causing crash on exit in MantisServer.
2. Updated CIGI plug-ins to utilize interrupt functionality in latest nVSync.
3. Added lightpoint based tracer special effect.

1.5.0 RC6 Notes

Fixes and enhancements

1. Added nVSensor plug-in.
2. Added Flock of Birds head tracker plug-in.
3. Added Polhemus head tracker plug-in.
4. Added viXsen support for starfield.
5. Added material classified special effects and environment textures.

1.5.0 RC5 Notes

Fixes and enhancements

1. Changed mantis path and texture path environment variables from user to system
2. Modified ServerMon to determine drive letter assignment for MantisServer if drive

letter not specified in MantisServer path.
3. Modified MantisServer to determine drive letter assignment for cache folder if drive letter is not specified.
4. Modified MantisServer to enable nVSync hardware synchronization if the nVSync DLLs are available (Note: this is only performed after initial installation).

1.5.0 RC4 Notes

Fixes and enhancements

1. Fixed channel mask plug-in (out-of-sync with other built software).
2. Updates to reliable UDP com channel.
3. Updated sensor data files.
4. Added GUI based CIGI utilities for processing CIGI data logs.
5. Updated texture unit assignment for light lobe and detail textures based on the number of texture units available.

1.5.0 RC3 Notes

Fixes and enhancements

1. Modified collision segment stretching to be sensitive to AOA.
2. Added collision segment editor to Detailer.
3. Fixed thread deadlock problem with models containing collision segments.
4. Added Laser Bird head tracker support.

1.5.0 RC2 Notes

Fixes and enhancements

1. Improved rendering performance for star field.
2. Modified culling information for sky model objects to prevent being culled.
3. Fixed bug in which LOS/HAT/HOT isectors were being set to ready state upon receipt of CIGI IgControl packet, resulted in intermittent HAT/HOT responses.
4. Added CIGI message traffic from IG to Host to CIGI datalog.
5. UDP com channel performance enhancements.

1.5.0 RC1 Notes

Fixes and enhancements

1. Integrated star field.
2. Integrated head tracker.
3. Added Rotor wash special effect.
4. Added Rain and snow viewport effects.

1.4.6 Notes

Fixes and enhancements

1. Added latest ViXsen plug-in with associated SigSim DLLs and example databases.
2. Added fix to igServer.dll so that it does not enable two-pass alpha when a light lobe is created.
3. Added latest SimGL driver and nVSync libraries.

1.4.5 ER8 Notes

Fixes and enhancements

1. Fixed CIGI ViewControl processing so that VLOS bias is set correctly.
2. Fixed compressed texture loading problem for TXP databases with embedded textures in which the texture is processed as if dirty and attempt is made to read from disk.
3. Added code to make MantisClient more tolerant to host commanding multiple operate/standby mode requests.
4. Added code to set the HAT/HOT and LOS isectors to the Ready state when entering operate mode.
5. Added check to missile trail special effect to only add trail nodes if the parent is moving.

1.4.5 ER7 Notes

Fixes and enhancements

1. Fixed isector metrics when isector processing is disabled, modified code to report misses for isectors when processing disabled.
2. Fixed vtLosIsector::Update() method to report miss if improper inputs are provided or associated scene is invalid. This fixes the “Too many isectors requested or no channel marked for isector processing” error.

1.4.5 ER6 Notes

Fixes and enhancements

1. Added fix to prevent rendering the same entity model multiple times, caused excess polygons to be rendered per frame.
2. Added code to correctly size the collision segments when an entity is placed/updated only once.
3. Added fix to correctly render the tanker director lights.

1.4.5 ER5 Notes

Fixes and enhancements

1. Added CIGI Start of Frame synchronization with OpenGL buffer swap via RS-232 interface.
2. Added SigSim v406 data files to InstallShield for igViXsen plug-in.
3. Removed call to clear the template part mapping in CIGI interface when Mantis is commanded to Standby mode.
4. Added call to load model scripts in the model copy constructor.
5. Updated calculation of horizontal and vertical asymmetry when processing CIGI View Definition packet.

1.4.5 ER4 Notes

Fixes and enhancements

1. Fixed MantisClient crash on restart problem caused by invalid light point intensity map from previous run.
2. Changed cloud visibility range from 100K to 2K so that navigation (fog) light flashback effect worked as expected.
3. Fixed special effect problem in which effects were duplicated using a running special effect template, caused inconsistent special effect starting.
4. Changed latitude/longitude angle unwrap algorithm to prevent hangs in MantisClient if extremely large angles are encountered.
5. Fixed grid cache invalidation bug in Vtree.

1.4.5 ER3 Notes

Fixes and enhancements

1. Added nVSync support to MantisClient for Quantum3D Independence.
2. Linked with VTree v4.1.0.
3. Increased number of HAT/HOT isectors from 16 to 48.
4. Increased number of LOS isectors from 16 to 48.
5. Increased model instantiation speed.
6. Added fix to unload CIGI models with inconsistent information.
7. Added additional MantisServer metrics.
8. Added support to toggle COM1 RTS line in conjunction with Start of Frame message.
9. Added code to set CIGI cloud color based on severity.

1.4.5 ER2 Notes

Fixes and enhancements

1. Added data enable support to CIGI Ver. 2.0 View Control packet.
2. Updated igCigiV2 plug-in to utilize data enables in View Control and Definition packets.
3. Fixed problem reporting CIGI database numbers greater than +99.
4. Added monitor refresh setting to Scene Load Management tab for determining swap interval timing.
5. Added code to synchronize graphics thread and CIGI Start of Frame packet (not verified).
6. Added time bias to lead sending CIGI Start of Frame packet prior to frame swap (not verified).
7. Disabled Allow tearing option for TXP databases.
8. Fixed a problem with intersection testing of externally referenced models in TXP databases. Externally referenced models must now be oriented with the TXP geometry according to the OpenFlight coordinate frame.
9. Modified OpenFlight2Vtree converter to take command-line options, in addition to specifying models on the command line.
10. Added heading correction code.
11. Modified aspect ratio computation made using CIGI View Definition data.
12. Detail texture from TerraPage terrains
13. Detail texture in OpenFlight models
14. Double precision calculations for transforms (not finished)
15. Double precision for mission functions
16. Improved optimization in TerraPage paging
17. Intersection testing using texture texels (for clouds)

1.4.5 ER1 Notes

Fixes and enhancements

1. Fixed mission function enables problem associated only with first channel.
2. Fixed alpha channel with 100% coverage CIGI cloud textures.
3. Updated igDis to operate as a true plug-in.
4. Modified code to allow CIGI and DIS plug-ins to operate simultaneously with selectable frame control master.
5. Added support for model light groups in Detailer.
6. Disabled scud from working inside cloud layers.
7. Increased terrain list depth to 127 entries.
8. Modified screen blank processing to prevent changes to viewpoint position.
9. Fixed problem with fx templates which occurred if a cluster fx was specified, resulted in incorrect mapping between defined and realized fx.
10. Added cross-channel animation sequence timing.
11. Fixed light point rendering problem associated with alpha and depth sort settings.
12. Defined new component identifiers for CIGI v1.0 component control.

13. Defined new component and instance identifiers for CIGI v2.0 component control.
14. Removed enable from CIGI tab, CIGI processing starts automatically if the plug-in is loaded.
15. Added reset feature to DIS and CIGI plug-ins, unloads all objects loaded by the plug-in.
16. Fixed north/south hemisphere coordinate problem with entity placement via CIGI.

Ownship collision with terrain usage

Proper operation of ownship collision with the terrain requires several steps, these are summarized as follows:

1. The ownship must be associated with a model containing collision segments. This can be accomplished through CIGI Entity Control using the entity type field. Typically this model contains only bounding volume and collision segment information, no geometry. A model with this information can be built directly or created from an existing model by deleting unnecessary geometry (vtSpliceTree can be used for this). Detailer can be used to verify that the model contains bounding volume and collision segment information.
2. The model used for ownship collisions must have the collidable and pickable flags set in the .scd file, this is accomplished using Detailer.
3. When instantiating the model via CIGI, the collision detect enable flag must be enabled and the entity state field must be enabled for CIGI v1.0 or set to load/show for CIGI v2.0.

If all of these steps have been taken, then when the ownship model intersects the terrain (or more specically when the collision segment(s) of the ownship model intersect the terrain), Mantis will report back to the host with a CIGI Collision Detection Segment Response message.

Ownship collision with other models (or model to model collisions)

Proper operation of ownship collision with other models in the scene requires several steps, these are summarized as follows:

1. The ownship must be associated with a model containing collision bounding volumes. This can be accomplished through CIGI Entity Control and the entity type field. Typically this model contains only bounding volume and collision segment information, no geometry. A model with this information can be built directly or created from an existing model by deleting unnecessary geometry (vtSpliceTree can be used for this). Detailer can be used to verify that the model contains bounding volume and collision segment information.
2. The model used for ownship collisions must have the collidable and pickable flags set in the .scd file, this is accomplished using Detailer.
3. When instantiating the model via CIGI, the collision detect enable flag must be enabled and the entity state field must be enabled for CIGI v1.0 or set to load/show for CIGI

v2.0.

If all of these steps have been taken, then when the ownship model intersects another model in the scene (or more specifically when a collision bounding volume of the ownship model intersects the collision bounding volume of another model), Mantis will report back to the host with a CIGI Swept Volume Collision Detection Response message.

It is important to note that the CIGI Swept Volume Collision Detection Response message will report back to the host all bounding volume collisions that are detected. This allows for missile to target intercepts to be detected, as well as other model to model collisions to be detected. If collision reports are not desired between specific models, then those models should not include collision bounding volumes or the collision enable flags should be disabled.

LOS collisions with clouds

The clouds are sensitive to LOS requests through CIGI, but within certain restrictions. The clouds in Mantis are built as two polygonal layers, top and bottom, with OpenGL fog enabled while in the cloud layer. Intersections with the clouds only occur with the top and bottom layers of the clouds and no intersections occur with the fog itself. Another consideration is that the cloud layers are selectively rendered based on the ownship (eyepoint) location. If the ownship location is below the cloud, then only the lower cloud layer is rendered. Conversely, if the ownship location is above the cloud, then only the upper cloud layer is rendered. And finally, when the ownship is in the cloud layer, then neither the upper or lower layer of the cloud is rendered. LOS intersections with the clouds can only be performed with the rendered portion of cloud layers, so depending on the ownship location, this result will be either the upper cloud layer, lower cloud layer or nothing.

When LOS intersections with the clouds are detected, the LOS results include a material code. The material code reported back to the host for a cloud layer intersection is 16384.

1.4.4 ER4 Notes

Fixes and enhancements

1. Fixed HAT/HOT response.
2. Changed default anti-collision and strobe colors.
3. Added support to control raster scan timing using render statistics level 3.
4. Fixed LOS isectors in conjunction with cloud layer and TXP database.
5. Demonstrated model animations under CIGI control.
6. Demonstrated volume collisions.
7. Demonstrated screen blank object under CIGI control.
8. Demonstrated light lobe under CIGI control.
9. Updated CIGI cloud textures.
10. Verified storm severity under CIGI control, phenomenon type must be 7.

11. Verified global visibility can be set to 0 using CIGI.
12. Verified scud working.
13. Verified patchy ground fog working.
14. Verified terrain lights controllable using CIGI.

1.4.4 ER3 Notes

New Features

1. Support for light lobes has been integrated into Mantis. Control of this feature is through CIGI component controls and is documented in the "CIGI v1.0 Component Control for Mantis.pdf" and "CIGI v2.0 Component Control for Mantis.pdf" manuals. Currently only one light lobe is supported and is attached to your ownship. A sample configuration and log file is included to demonstrate this feature, the sample Nellis.txp database must also be installed.
2. Animation scripting has been integrated into Mantis. This capability allows for the control and execution of complicated model articulations using single component control commands. Animation scripts can be added, removed and edited using Detailer. Detailer also allows the user to specify CIGI component id's for each animation script. These CIGI component id's must be unique among model switches and lights.
3. Fog lights now default to the color red, have a range of 750 ft and blink at the same rate as the anti-collision lights on the F15 fighter model.
4. Cloud layers are now pickable and will return intersection results with a material code of 16384.
5. The screen blanking feature is now under CIGI control and is documented in the "CIGI v1.0 Component Control for Mantis.pdf" and "CIGI v2.0 Component Control for Mantis.pdf" manuals.
6. Segment and volume collision now supported in Mantis using CIGI v2.0, segment collision is also available using CIGI v1.0. Segment collision only works for the ownship and requires that the ownship model have segments pre-defined in it.

Fixes and enhancements

1. Mission functions now function correctly when executed on channels with rendering disabled.
2. Special effect instantiation performance has been improved. In other words, the time it takes to create a special effect has been reduced.
3. CIGI Component control for CIGI v2.0 has been brought up to latest release, had been written to preliminary v2.0 documentation.

General Notes

1. The installation consists of one CD/ROM, the contents of which are listed below:
    a. CD/ROM #1 - "MANTIS 1.4.4"
        i. Mantis 1.4.4. InstallShield setup
        ii. Nellis TXP terrain (RGB version)
2. If you install the application to the "\Mantis"of any system drive (e.g. "c:\Mantis", "d:\Mantis", etc.) most of the paths are correct in the configuration files. Otherwise, you will have to manually fix the paths.
3. You will need to install a license on the machines. You can either call or email in to our technical support to get the license keys. Install the MantisClient and MantisServer licenses on all machines.
4. A demo CIGI log file (NellisFlyThruWithFx.log) is provided. Basically it shows the eyepoint being flown across the Nellis database provided on the same CD/ROM, with missile fly-outs, ground impact, and target destruction.

Application Installation

1. Run the InstallShield "setup.exe" application to begin the install.
2. Choose the "\Mantis" directory of a system drive as the installation folder (e.g. "c:\Mantis").
3. Allow the installation to complete
4. Log out and back in to allow the new file path environment to be configured.

Nellis RGB TerraPage Archive Installation

1. Run WinZip and unzip the contents of nellis zip file onto the same folder chosen for the application (e.g. "c:\Mantis").

Application Configuration

1. Run "PfdChooser" to configure the host for VTree. Choose a low-numbered format with the desired settings, if possible.
2. Start ServerMon.exe (the red "heart" icon) from the "start" menu
3. Make sure MantisServer starts as a result. If it does not, then you will need to verify that the ServerMon dialog settings are correct. The following are the correct settings for an installation into the "c:\Mantis" directory:
    a. Server Filename: "c:\Mantis\server\MantisServer.exe"
    b. Arguments: "start"
    c. Timeout: "2"
    d. Monitor The Server: checked
    e. Exit and restart to save the settings to the "ini" file.

4. Check the MantisServer settings. The application will automatically start because of the "start" argument supplied by ServerMon. If you need to change a setting in the GUI, you will have to press the "Stop" button, make the changes, and then press the "Start" button. Here are some things to check:
    a. Comm
        i. Primary IP interface - must have a valid IP address
        ii. Discovery Port - 5050
        iii. Primary TCP Port - 15000
    b. Cache
        i. Folder - should be set to "c:\Mantis\cache" for the default installation
    c. General
        i. "Use OpenGL Display Lists" should only be checked for Quantum3D hardware
    d. Plug-ins
        i. Add "igOpenFlight.dll" if you plan on loading OpenFlight files
    e. Security
        i. Make sure all three "Client Hosts" check boxes are enabled
        ii. Make sure "Include" and "Exclude" are disabled
    f. HW Sync
        i. Enable - checked if running on Wildcat hardware with GenLock cabling
    g. "Start" button should be pressed to start the server
5. Start MantisClient.exe from the "start" menu
6. Load the "NellisTxpWithCigi.mpf" configuration file
7. Verify the settings on each tab and sub-tab. Critical items include:
    a. Discovery Port: 5050
    b. Online Servers: (shows the host that MantisServer is running on)
    c. Terrain file: "c:\Mantis\Nellis\Archive.txp"
    d. Terrain origin: Lon=122W, Lat=35N, Alt=0
    e. CIGI tab
        i. Simulation Host: (name of host/laptop that will run VT3Host - optional)
        ii. Message Rate: (desired frame rate. eg. 60)
        iii. Send/Receive Ports: 8000/8001
        iv. Filename: "c:\Mantis\data\cigiLogs\NellisFlyThruWithFx.log"
        v. Enable: on
        vi. (Press the "Apply" button to apply changes)
8. Start MantisClient
    a. A window will appear after a few seconds
    b. A message resembling "Entering main loop" will appear in MantisClient "Messages" tab.
    c. The Terrain will page in and appear on the 3D window (viewed from beneath)

9. Start the CIGI playback
    a. From the “CIGI” tab of MantisClient
    b. (Press the “play” button - triangle)
10. The 3D window should now be rendering the viewpoint playback

Important Notes

1. The performance of Mantis is affected by network hardware latency. Most systems include a configuration utility to allow the user to select either a “low latency” or “low bandwidth” setting. If available, change this setting to “low latency”.
2. Better performance can be achieved on systems with hardware genlocking by enabling hardware genlocking and **disabling** “Frame Swap Sync” in MantisClient.
3. For best performance, make sure the texture usage does not over burden the target host 3D subsystem.
4. When the “Stop” button is pressed on MantisClient after a session, the MantisServer application exits. ServerMon is responsible for bringing MantisServer back up after a run. This is normal for this demo release.
5. Be sure there are NO VTree/Mantis DLLs installed on the target computers before running. The “About” tabs on MantisClient and MantisServer allow you to see exactly which DLLs are loaded. In particular, the following files should be in only one place on the target hosts:
    a. igCommon.dll
    b. igClientSdk.dll
    c. igServer.dll
    d. VTreeDLL400.dll
    e. VtTerraPageDLL400.dll
    f. vtTrPage400.dll
    g. NCS*.dll
    h. mg*.dll
    i. fltdata.dll
    j. 3D*.dll