ADC and D-Series Services

- Provides a modern RESTful layer between device server and clients, providing a simplified common integration layer; where possible sharing common API calls with ADC and D-Series

- Utilizing platform agnostic, extensible, COTS messaging layer
  - Provides a common message bus
  - Enhanced interoperability between other Imagine Communications products

- Platform for development of web-based applications

- Defined API for 3rd party applications, such as dynamic branding or EPG functionality.
Cloud Xtream, cDVR Solution Architecture

- DAI Solution = Dynamic Ad Insertion Solution
- Complementary Product Platforms
- Partner Integration for Storage, DRM, Ad Campaigns, and Cloud Hosting

CloudOrchestration

Storage and Private/Public Cloud
CloudXtream cDVR Overview

- Live-to-file video capture for Multiscreen
  - Shared or private copy with Event-based and Continuous record
- Operator- or user-scheduled recordings through middleware
- Support for Catch-up TV, Time-shift, Restart TV
- Just-in-Time Packaging and Origin of all ABR formats

Middleware Scheduler

Digital Rights Mgt.

SelenioNext Transcoder → Recorder → Recording Manager → Just in Time Packager (JITP) → Mezzanine Storage (HLSv4) → JIT Transcoder

Content Delivery Network (CDN)

Web Portal

Internet/OTT

Mobile TV

Smart Devices
Dynamic Ad Insertion - Explanation

**Before:**
- Ads are part of the content
- Everyone gets the same ads

**After:**
- Ads are separated from the asset and inserted “on the fly” as the asset is streamed, based on triggers
- Substantially increases the value of an ad spot – ads are engaging and relevant
- Can be targeted at zones or individuals

Original ads replaced
Leading the Way with Our Software-Defined Networking & Workflows
SelenioFlex™ File: File-to-File Processing

- High-value, high-quality file-to-file transcoding
- Enterprise-class system to streamline and automate file-based media processing operations
- Fully automated, high-volume operation
- Distributed architecture (Manager + Engines) scalable from small transcoding ‘farms’ to globally dispersed operations with hundreds of processing engines
- Powered by Zenium™
- NAB highlights: Interoperable Master Format (IMF – Netflix UHD), HD->UHD upres support with Cinnafilm Dark Energy plugin, JPEG2000 Encoder, HEVC 4Kp60 Encoder release
SelenioFlex™ File – Value Propositions

 Enables customers to...

- Take control of their workflows with unmatched software-defined workflow flexibility
  - Includes Zenium™ Designer to build exactly the custom workflow processes they need with unparalleled flexibility and precise control

- Look better with superior quality & bit-rate efficiency
  - Impress audiences while reducing delivery costs

- Work smarter with unmatched automation intelligence
  - Adaptive, automated decision-making maximizes efficiency, minimizes errors

- Adapt faster with easiest integration of new technologies
  - Quickly respond to changing market dynamics and new opportunities
SelenioFlex™ File – Zenium™ Designer

- Debug processing issues directly
- Optimize processing by visually identifying common tasks
- Preview output directly
- Create custom components, publish to repository
- Available as Stand-alone, without SelenioFlex™ File Manager:
  - SFX-FILE-SA-WEB
  - SFX-FILE-SA-STUD
SelenioFlex™ File – Zenium™ Designer

- Blueprint design interface
- Single run-time license included with SelenioFlex™ File Manager; additional licenses are available, part#: SFX-FILE-XEN-DSGN
- Test (execute) blueprint directly in Designer

**NOTE:** requires available run-time Engine license

- Create intelligent workflow decisions using dynamic logic branches, on ANY property
HEVC Development

- HEVC is simply a new codec that will plug into existing Selenio products
  - Adding HEVC for ABR, and traditional linear distribution operates the same from a system level as h.264

- Develop HEVC codec components in Zenium
  - We currently support a HEVC S/W encoder
  - Adding support for additional HEVC S/W encoders

- SelenioFlex utilize the Zenium HEVC components
  - SD to UHD, VOD and ABR assets (Q1 2015)
    - File to File encoding in SelenioFlex File
    - SDI to File through with SelenioFlex Ingest and File
  - SD to HD, linear ABR delivery (Q1 2015)
    - SDI and linear and ABR HEVC encoding in SelenioFlex Live
    - MPEG-2/h.264 to HEVC transcoding in SelenioFlex Live
    - UHD Encoding demo available now
SelenioFlex™ Live HEVC UHD Encoding

New Features

- HEVC video up to 1920x1080p60 for linear distribution encoding Transport Stream outputs
- HEVC video up to 1920x1080p60 for ABR applications via multiple profile Transport Stream outputs

Technology Preview

- HEVC video up to 3840x2160p60 UHD/4K for linear distribution encoding Transport Stream outputs
- Transcoding from MPEG-2/H.264 in MPEG Transport Stream over IP inputs

Applications

- Sports live streaming
- New media web/mobile streaming
- Entertainment/event online streaming
- Broadcast simulcasts
Zenium™ – A Platform for Cloud Processing

- Zenium is a platform upon which products, solutions, and services are built
- Agile software environment for the design, deployment and management of customizable Software-Defined Workflows (SDW)
- Powerful, flexible software-based workflow management framework and workflow building blocks
- Provides an extensible platform for building sophisticated, automated, multistage workflows, applications, and services (incl. but not limited to video, audio and metadata processing)
Routing Switcher Portfolio

- **Enterprise Large and Medium Routing**
  - Platinum™ IP3
  - Platinum™
  - Platinum™ MX
  Industry-leading capabilities with even the largest system requirements, up to 2Kx2K

- **Small to Midsize Utility Routing**
  - *New! Platinum™ VX*
  Unsurpassed value for your mid-scale video routing needs

Images of Platinum MX, Platinum IP3, and Platinum VX are shown.
# NEW! Platinum™ VX – Affordable Video Routing

## Multiple Matrix Sizes in 4 Frames

<table>
<thead>
<tr>
<th>Size</th>
<th>1RU</th>
<th>2RU</th>
<th>4RU</th>
<th>8RU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 32x32</td>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
<td><img src="image3.png" alt="Image" /></td>
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<tr>
<td>Up to 144x144</td>
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<td><img src="image6.png" alt="Image" /></td>
<td><img src="image7.png" alt="Image" /></td>
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<tr>
<td>Up to 72x72</td>
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<td><img src="image10.png" alt="Image" /></td>
<td><img src="image11.png" alt="Image" /></td>
<td><img src="image12.png" alt="Image" /></td>
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<tr>
<td>Up to 288x288</td>
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<td><img src="image15.png" alt="Image" /></td>
<td><img src="image16.png" alt="Image" /></td>
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</table>

- Coaxial and Fiber Interfaces
- Supports Magellan Control Surfaces
- Platinum-Level Reliability
NEW! Platinum™ VX – Key Benefits

- **Unmatched density** – Offers the highest density per rack unit of any SDI video routing system

- **Built-in Magellan control** – Eliminates need for external controller in system set up and configuration, simplifying and speeding up the process

- **Fiber and electrical connectivity** – Utilizes SFP and HDBNC modules for complete configuration flexibility

- **Industry-proven** – Optimizes widely deployed Platinum router technology, delivering high quality and reliability

- **Future-proof flexibility** – Upgrade the 4RU and 8RU frames in the field, as routing demands change

- **Efficient operation** – Works seamlessly as part of larger routing system in hybrid environment under the overarching management of Magellan™ SDN Orchestrator
Magellan™ SDN Orchestrator

- Supports IP/SDI hybrid networks
- Mix of physical and virtual processing functions
- Control framework for hybrid SDI/IP facilities
  - Makes everything ‘look like a router’
  - Take Source to Destination – Simple
  - Control through current routing protocols and current control panels
  - Compatible with automation, tally, MV, etc.

- SDN Orchestrator controls and monitors the virtual plant, providing operational visibility
Magellan™ SDN Orchestrator

- Control framework for hybrid SDI/IP facilities
- Seamless way to create, optimize, play and deliver media content
- De-couples management & services from transport & HW
- Supports coexistence of IP streams, files, and baseband
- Scalability, elasticity & geo-diversity
- Orchestration instantiates functions, features into meaningful services
- Highly configurable via Software-Defined Workflows (SDW)
Selenio™ MCP, Selenio™ 6800+, Selenio™ X-Series

Selenio MCP
3RU/1RU H/W modular platform
• High-end, full range processing solution
• On ramps/Off ramps (Interfaces)
• Pixel-based (Baseband) processing

Selenio 6800+
2RU H/W modular platform
• Full range of processing solutions
• Application-centric modular solution
• Modular solution with competitive price points
• Comprehensive fiber solutions

Selenio X-Series (X100, X50)
1RU platform
• 1RU single- and dual-channel solution
• Future-proofed for UHD-1 and 10 GBE and HDMI 2.0
• High-end audio processing capabilities, including DD+
• Extensive feature set with high quality and reliability
• Pixel-based (Baseband) processing
UCIP

- Supports bi-directional multi-channel transport of 3G/HD/SD-SDI video signals over 10GigE link on a single slot module in Selenio MCP platform
- Supports for SMPTE 2022-5 Forward Error Correction for protection against packet losses created by occasional network errors
- Supports for SMPTE 2022-6 RTP transport over 10 GigE IP links
- Supports for SMPTE 2022-7 seamless protection specification
- Eight configurable input/output HD-BNCs connectors
- Transmits (SDI → IP) up to six streams simultaneously and Receives (IP → SDI) up to four streams simultaneously within the limits of available I/O connectors and bandwidth on the Ethernet link (6 streams reception planned for Release 2.0)
- Support Any combination of standards that fit into the 10GGE connection
- Frame syncing of the output SDI signals (Receive side), including audio sample rate conversion to the frame reference
- Supports clean switching between input video on IP sources. Pass-through of all SDI audio
- Dual-network interfaces supporting 10GbE SFP+ electrical/fiber
- Support for Unicast and Multicast transmission
- Software-key-upgradeable between the different channel options
Uncompressed Quad Link Over Fiber (Tx)

- **OP+TDMT+8**
- **4 Channel 3 Gb/s Input, TDM Fiber Transmitter**
  - Readily available
  - 12 Gb/s payload and 12.44 Gb/s transmission data rate
  - SMPTE 2036-1 UHDTV1
  - Transport for up to four unidirectional 3 Gb/s SDI
  - Transparent end to end transmission, with unmodified passthrough of vertical and horizontal ancillary data
  - Input signal format detection
  - Input video CRC status detection at transmitter and receiver
  - Full hot swapping capability in a Selenio 6800+™ frame
  - Thumbnail streaming for monitoring video signals
  - Automatic equalization, reclocking and rate reporting
  - Link status reporting laser status and receiver power monitoring
  - Dedicated input monitoring port on transmitter

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UHDTV1 Up/Down Conversion Modules

- SEL-2UHD-U-EES UHDTV-1 Up Conversion
- SEL-2UHD-D-EES UHDTV-1 Down Conversion
  - Quad link SDI interface
  - Auto Detected Input
  - Pass through
  - Frame sync, proc amp, color correction
  - Variable aspect ratio
  - Crop Controls with joystick control
  - Quad based and pixel interleaved (future) capability
  - Level A and Level B-DL conversions
  - Color Space Conversion TBD (608/709/2020)
  - 12-bit possible 30 FPS or less

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**UHDTV1 Frame Sync**

- The new SEL-4CQS1-S Clean and Quiet Switcher has four 1080P frame syncs built-in and can be used as a quad link frame sync.
- Being re-defined at this time for a ganged control for a quad link SDI interface.
- Auto Detected Input.
- Pass through with clean and quiet output.
- Frame sync, (TBD proc amp, color correction).
- Quad based and pixel interleaved (future) capability.
- Level A and Level B-DL conversions.
- Can be used on router output for clean switching.

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UHDTV1 Up/Down Conversion

- **X100-1RU-2RU**
- **Dual-Channel Intelligent Frame Sync and Conversion**
  - Future proofed for UHDTV1 and 10 GBE
  - Video and audio synchronization and delay (locked and timed output with proper lip sync)
  - Video and audio conversion
  - Handles legacy analog video and audio, current digital video and audio and future IP signals
  - Used in hybrid systems as a bridge between analog, SD, HD, 3G (1080P) and IP

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Mezzanine Compression

- There are two mezzanine codecs emerge:
  - Sony IP Live (12 Gb/s over 10GBE)
  - Intopix TICO (12 Gb/s over 3 Gb/s SDI and 10 GBE)
- Sony and Intopix plan on publishing RDD (Registered Disclosure Documents) with SMPTE
Selenio MCP Networked UHD Transport for Signals

- Product definition under way now
- Support for HD and UHD
- 32 channels of embedded audio capability
- Frame sync, proc amp
- Up and down conversion
- Quad (UHD)/single link (HD) SDI interfaces (level A/B, SQD/2SI)
- Dual 10 GBE ports SMPTE ST 2022 and AES-67 compliant
- IP Live mezzanine format (future TICO)
- Eight operational modes:
  - Quad link input and output, 1 x IP Live encode, dual 10 GBE output
  - Quad link input or dual 10 GBE input, 1 x IP Live decode, quad link output
  - 4 x single link HD input, UHD up conversion, 1 x IP Live encode, dual 10 GBE output
  - Quad link or two 10 GBE input, 1 x IP Live decode, UHD down conversion, 4 x single link HD output
  - Quad link input, 1 x TICO encode, 4 x TICO single link 3 Gb/s outputs and dual 10 GBE output
  - 4 x TICO single link 3 Gb/s inputs or dual 10 GBE input, 1 x TICO decode, Quad link output
  - 4 x single link HD input, UHD up conversion, 1 x TICO encode, 4 x single link TICO output, dual 10 GBE output
  - Quad link or two 10 GBE input, 1 x TICO decode, UHD down conversion, 4 x single link HD output
Selenio MCP Networked UHD Transport for Signals

- Product definition under way now
- 16 channels of embedded audio capability
- Quad/single link SDI interfaces (level A/B, SQD/2SI)
- Dual 10 GBE ports SMPTE ST 2022
- TICO mezzanine format
- Add UHD Up and Down conversion modules as necessary:
  - Five operational modes:
    - Quad link input, 1 x TICO encode, 4 x TICO single link 3 Gb/s outputs and dual 10 GBE output
    - 4 x TICO single link 3 Gb/s inputs or dual 10 GBE input, 1 x TICO decode, Quad link output
    - 2 x Quad link inputs, 2 x TICO encoders, two 10 GBE outputs
    - Two 10 GBE inputs, 2 x TICO decoders, 2 x Quad link outputs
    - Bi-directional: quad link input, 1 x TICO encode, 10 GBE output and 10 GBE input, 1 x TICO decode, quad link output
Putting It All Together

- **T & M**
- Quad Link and SDI Sources
- Quad Link (O to E)
- TICO over 3 Gb/s
- Quad Link, and SDI Distribution
- Quad Link and SDI Routing
- TICO Decoder SONY IP Live
- Record/Playback
- TICO Encoder SONY IP Live
- File- Based Processing
- Graphics
- Play Out

**Cisco, Brocade, Arista IP Switch**

**Quad Link (O to E)**

**Quad Link, and SDI Routing**

**Edit**

**Up/Down Conversion**

**Quad Link ACO**

**TICO over 3 Gb/s**

**SONY IP Live**

**TICO over 3 Gb/s**

**TICO over 3 Gb/s**

**Quad Link (E to O)**