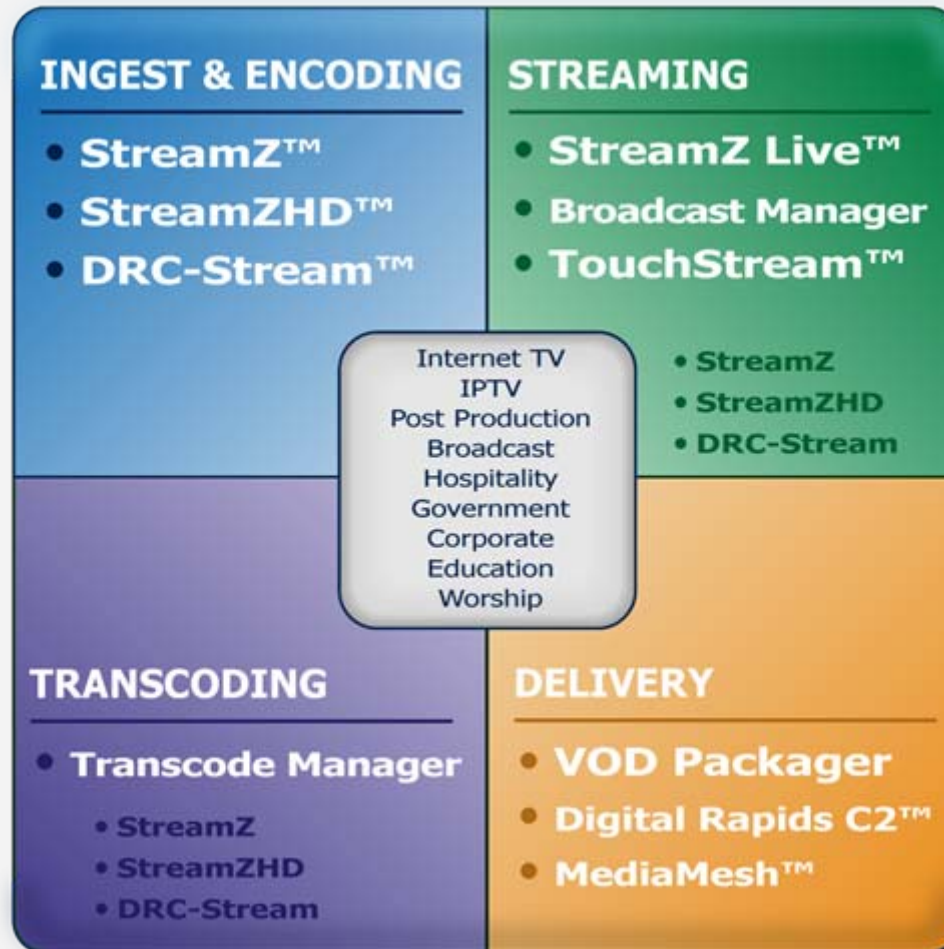




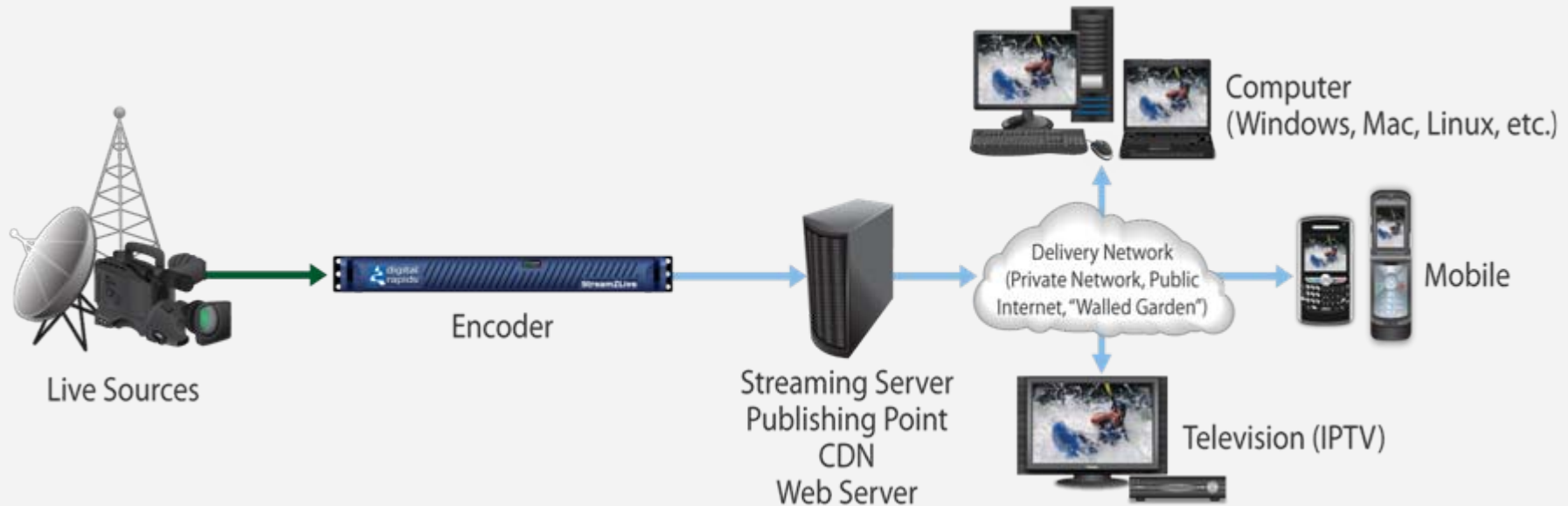
# Connecting Content to Opportunity – the Need for Media Files

**Incospec “Content to its Distribution 2010 Tour”**

March 9th & 11th , 2010



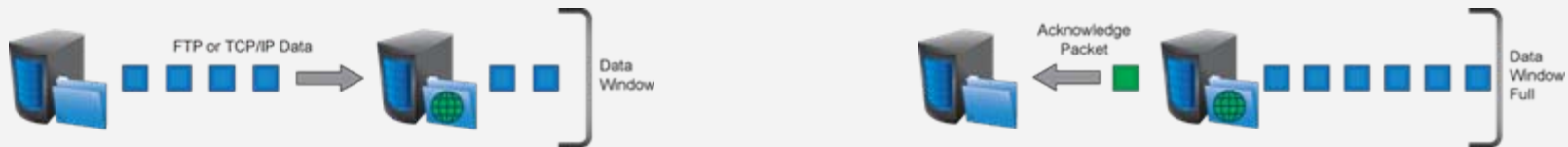
Real time Digital Stream delivery – Mpeg2 TS, or RTMP, RTP Streaming.



- File Delivery - Moving data from point to point, multipoint
- Typically FTP methods, terrestrial, land travel (Tape)
  - (dedicated VPN, Public IP and Satellite)

- Today's media landscape characterized by:
  - Rapidly expanding volume of content
  - Wider distribution and syndication across multiple viewing platforms
  - Broadening, increasingly diverse types of distribution outlets
- Result: need for more efficient mechanisms to deliver media between content providers, contributors, aggregators and distribution partners
  - Physical distribution expensive, time-consuming, labor-intensive
  - Moving to electronic delivery over terrestrial IP networks or satellite
    - Significant cost savings, increased automation, greater immediacy, higher security
    - But: workflow inefficiencies and performance impediments to overcome (delivery protocols, bandwidth costs, file size, distance)

- Efficiency over IP-based networks is limited by inherent performance impediments in underlying communications protocols:
  - Limits transfers to a fraction of their potential speed and reliability
  - Poor transfer on private networks
  - Crippled over the public Internet
  - Inefficiency increases dramatically with high bandwidths and long distances
- Root of performance limitations stems from the nature of underlying TCP/IP protocol



- Transmitted data packets must be received in the correct order
- Data sent sequentially up to the size of the recipient's receive window
- When receive window is full, receiver sends acknowledgement back to sender
- Acknowledgement must arrive at the sender before further data is transmitted

## Latency

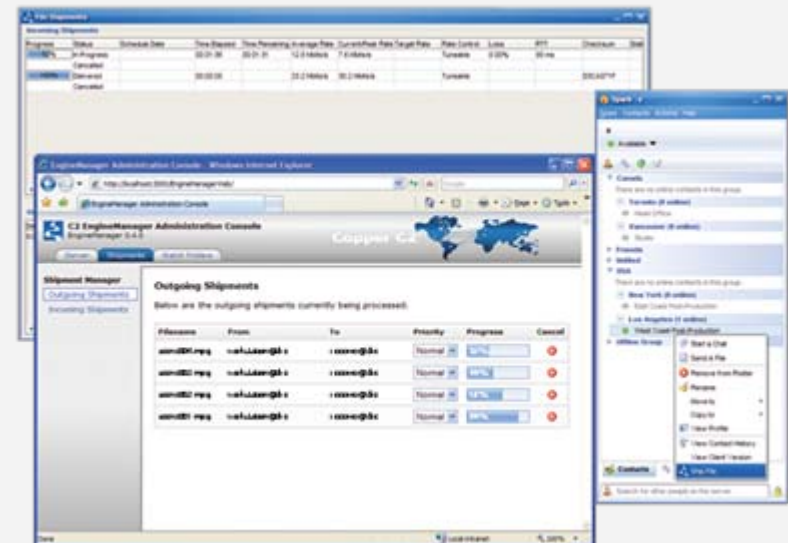
- Round-trip time between sending data and receiving acknowledgement
- Limits transfer speeds irrespective of available bandwidth
- Local and regional (e.g. within a city) networks may have latency <10ms, but public networks across country or between continents much higher
- Many factors of network infrastructure affect this latency, but net result is a significant impediment in overall throughput of TCP/IP-based transfers

## Packet Loss

- Transmitted data packet does not reach its destination
- Can be caused by many factors, but typically network congestion
- Basic TCP/IP – entire receive window retransmitted even for one failed packet
- Large amounts of bandwidth wasted re-sending data that was already successfully received

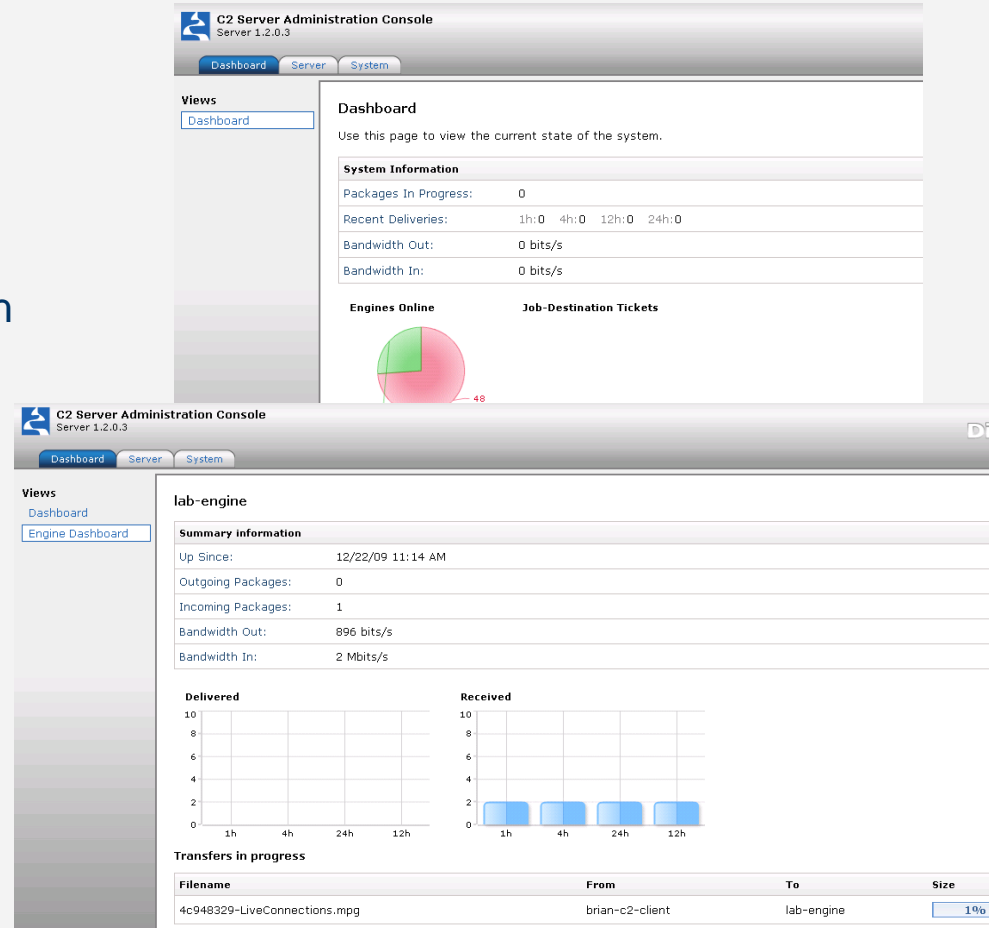
## Digital Rapids C2™

- Transfer of large media and data files between contribution, collaboration and distribution points
- Fast, secure, reliable file transfer over even the most unreliable networks
  - **UDP v. FTP, Forward Error Correction**
    - Packets can be continually sent – overcomes latency problem; can utilize almost all available network bandwidth
    - Packets may be delivered out of order; re-ordering managed by application Overcomes loss and latency
- Delivery confirmation receipts
- Tunable rate control
- Secure file transmission with encryption



## Dashboard

- Aggregate System Information
  - Snapshot of overall system
  - Deliveries (1, 4, 12, 24hrs)
  - Aggregate inbound/outbound bandwidth
  - Engines online
  - Job Ticket Utilization.
  - etc.
- Detailed Engine View
  - Uptime
  - Incoming/Outgoing Shipments
  - Inbound/Outbound bandwidth
  - Transfers in Progress.
  - etc.
- Reporting Web Service API and SOA
  - C2 Server and Engine Manager



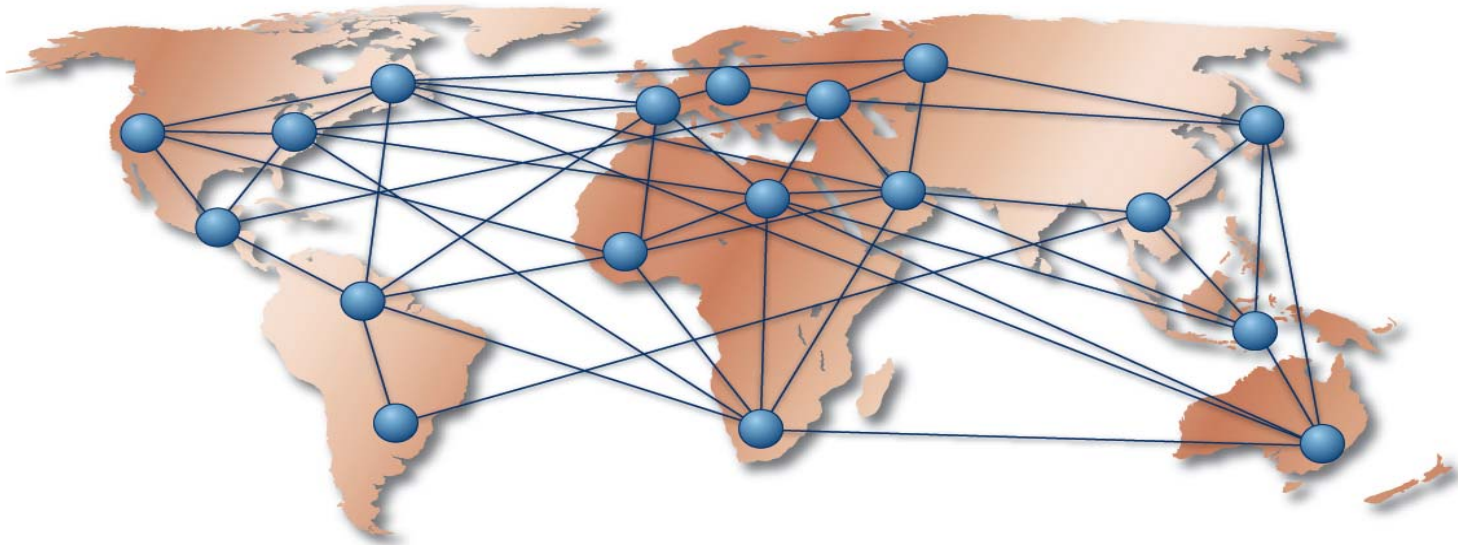
The screenshot shows the C2 Server Administration Console interface. The top section is the 'Dashboard' view, which provides an overview of the system's current state. It includes a 'System Information' table with metrics like Packages In Progress, Recent Deliveries, and Bandwidth. Below this is a pie chart for 'Engines Online' and a section for 'Job-Destination Tickets'.

The bottom section shows the 'lab-engine' view, which provides detailed information for a specific engine. It includes a 'Summary information' table with metrics like Up Since, Outgoing Packages, Incoming Packages, and Bandwidth. Below this are two bar charts: 'Delivered' and 'Received', showing data over time (1h, 4h, 24h, 12h). At the bottom, there is a table for 'Transfers in progress' with columns for Filename, From, To, and Size.

Metric	Value
Packages In Progress:	0
Recent Deliveries:	1h: 0 4h: 0 12h: 0 24h: 0
Bandwidth Out:	0 bits/s
Bandwidth In:	0 bits/s

Metric	Value
Up Since:	12/22/09 11:14 AM
Outgoing Packages:	0
Incoming Packages:	1
Bandwidth Out:	896 bits/s
Bandwidth In:	2 Mbits/s

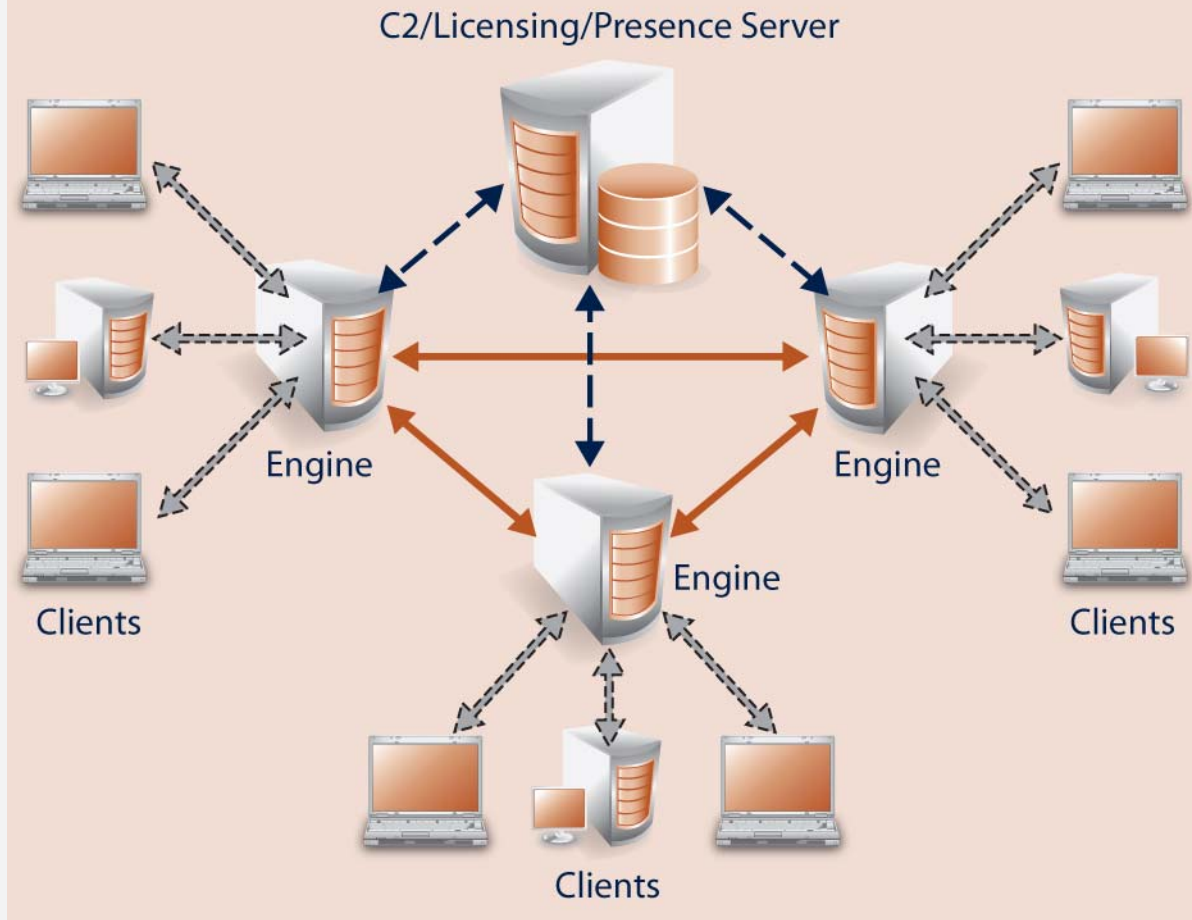
Filename	From	To	Size
4c948329-LiveConnections.mpg	brian-c2-client	lab-engine	100



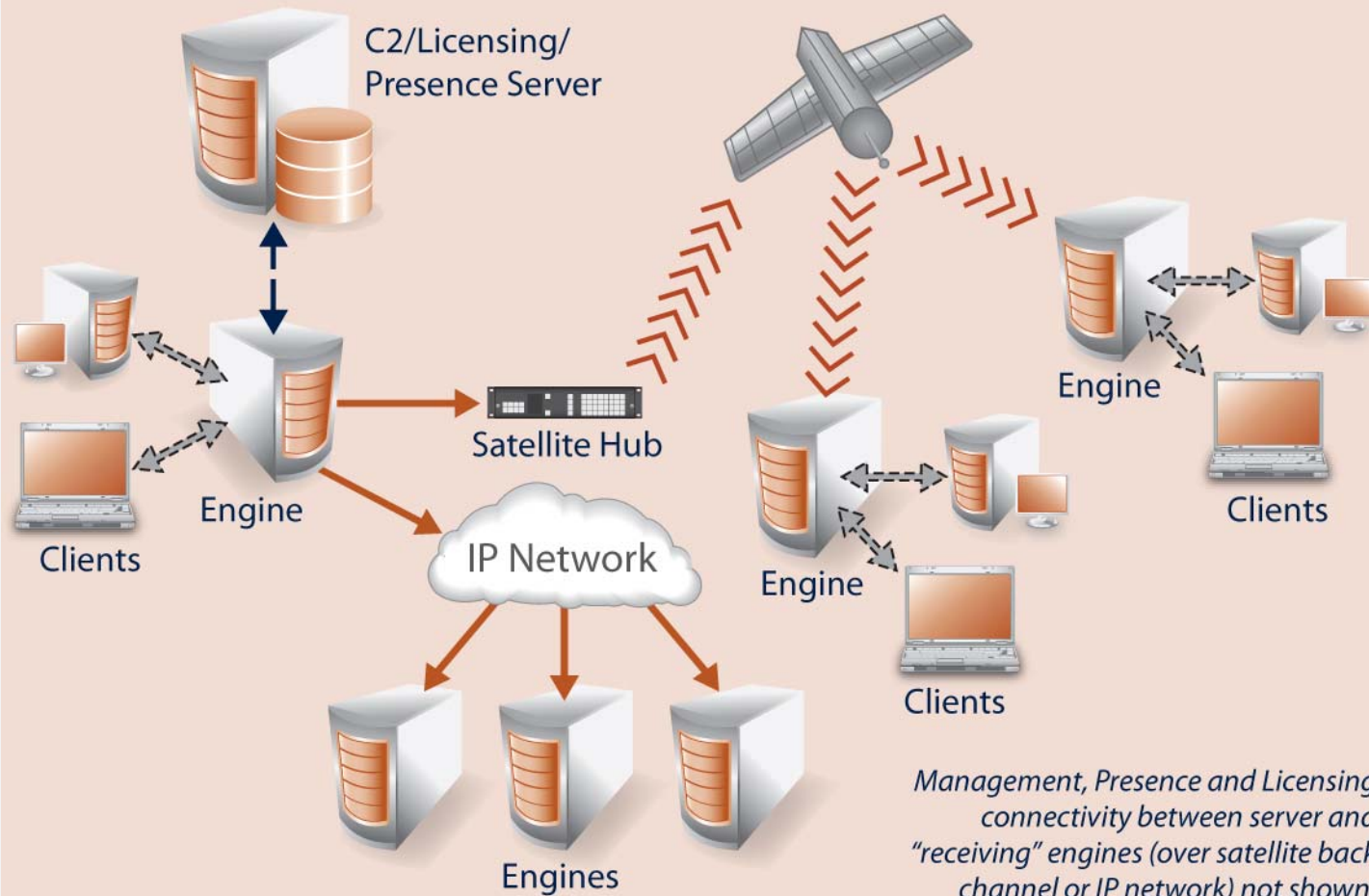
- Network mesh topology with multiple simultaneous parallel file transfers
- Multiple distribution models – satellite or IP multicast, IP unicast, and hybrid
- Submit jobs from easy desktop client, watch folders or Web Services API

- C2 Server
  - C2 Server
  - DRC License Server
  - Presence Server
    - (Openfire)
- C2 Engine
- C2 Client
  - Spark IM
  - Stream
  - Transcode Engine
  - MediaMesh
  - Web Service Integration

## *Simplified C2 Unicast Architecture Overview (three Engines)*



## Simplified C2 Multicast Architecture Overview



- Challenges for contribution/submission scenarios:
  - Each may have specific format (compression, container, etc.), conformance and metadata requirements
    - Even just looking at “broadcast” – brands/models of servers
      - Varying containers (GXF, LXF, MXF, MOV)
      - Differing metadata supported and/or required
      - Possibly even differing preferred compression (MPEG-2, DVCPPro, etc.)
  - Increasing number and diversity of contributors
  - Original media being submitted may not meet final formatting/conformance requirements
  - Incoming media must be validated beyond technical considerations (correct content, appropriateness, etc.)
  - Additional metadata may be needed beyond that submitted

- Challenges for distribution scenarios:
  - Breadth exceeds traditional ‘broadcasters and affiliates’ model
  - Distribution partners may span multiple platforms/channels: VOD, Web, Electronic Sell-Through, mobile, D-Cinema, etc.
  - Recipients may not have dedicated network lines or satellite access – reachable only over public networks (Internet), with inherent performance limitations

## MediaMesh™

- Efficient network-based digital delivery of HD, SD and digital cinema content between content providers, contributors and distribution partners
- Increased automation and tremendous cost savings over traditional tape-and-truck media distribution
- Ideal for delivering ad spots through long-form content to affiliates, aggregators and distributors
- Multiple distribution models – satellite or IP multicast, IP unicast, and hybrid models
- Turnkey media receiving appliance with integrated inventory management, visual QC, repurposing, packaging and playout
- Extensive integration capabilities via Web Services API, open standards, VDCP, RS-422
- Intuitive graphical touch-screen interface for easy operation



## MediaMesh Content Delivery System

- Digital delivery of HD, SD and Digital Cinema content over IP-based networks and satellite
- Efficient transfer of content ranging from ad spots, promos and paid programming to syndicated shows and long-form features
- Content submission through web-based portal, integration with other Digital Rapids solutions, Web Services or custom development tools
- Flexible, robust receiving appliances with integrated inventory management, conforming, repackaging and output



TVB EUROPE ★ Editors' Awards  
**Best of IBC2009**



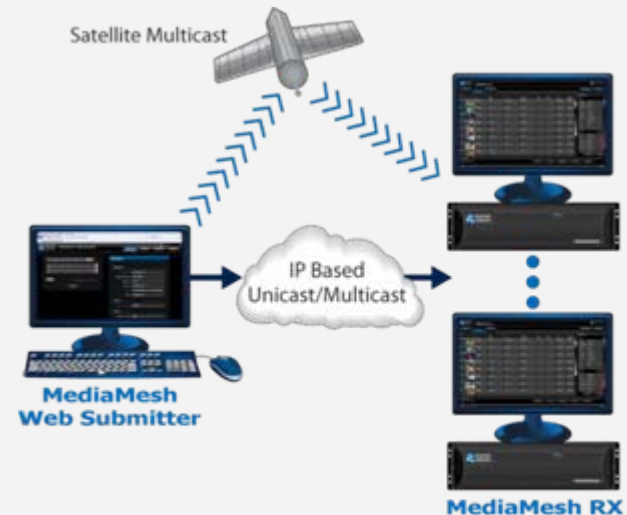
## MediaMesh Submission/Contribution

- MediaMesh Web Submitter
  - Submission of media files through browser-based interface
  - Enter/attach technical (e.g. VANC), descriptive and syndication metadata
  - Automatic conformance to mezzanine/house format
  - Proxy and thumbnail creation
- “Pre-packaged” content from Digital Rapids encoding and transcoding systems can be submitted through C2 delivery software or watch folders
- Submission applications can be built through Web Services and custom development tools



## MediaMesh Delivery

- Delivery models including satellite (multicast), terrestrial IP-based networks (unicast or multicast) or hybrids
- Built on scalable Digital Rapids C2 data delivery framework
  - Overcomes performance limitations of TCP/IP transfer methods such as FTP
  - Fast, secure, reliable file transfer even over the Internet
  - Immediacy of near-wirespeed transfers
  - Network mesh architecture with multiple simultaneous parallel file transfers for efficient multi-recipient distribution



## Receiving – MediaMesh RX

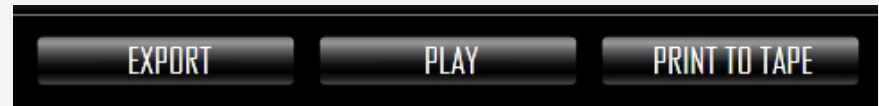
- Turnkey receiving appliances with integrated visual QC, inventory management, conforming, repurposing and output



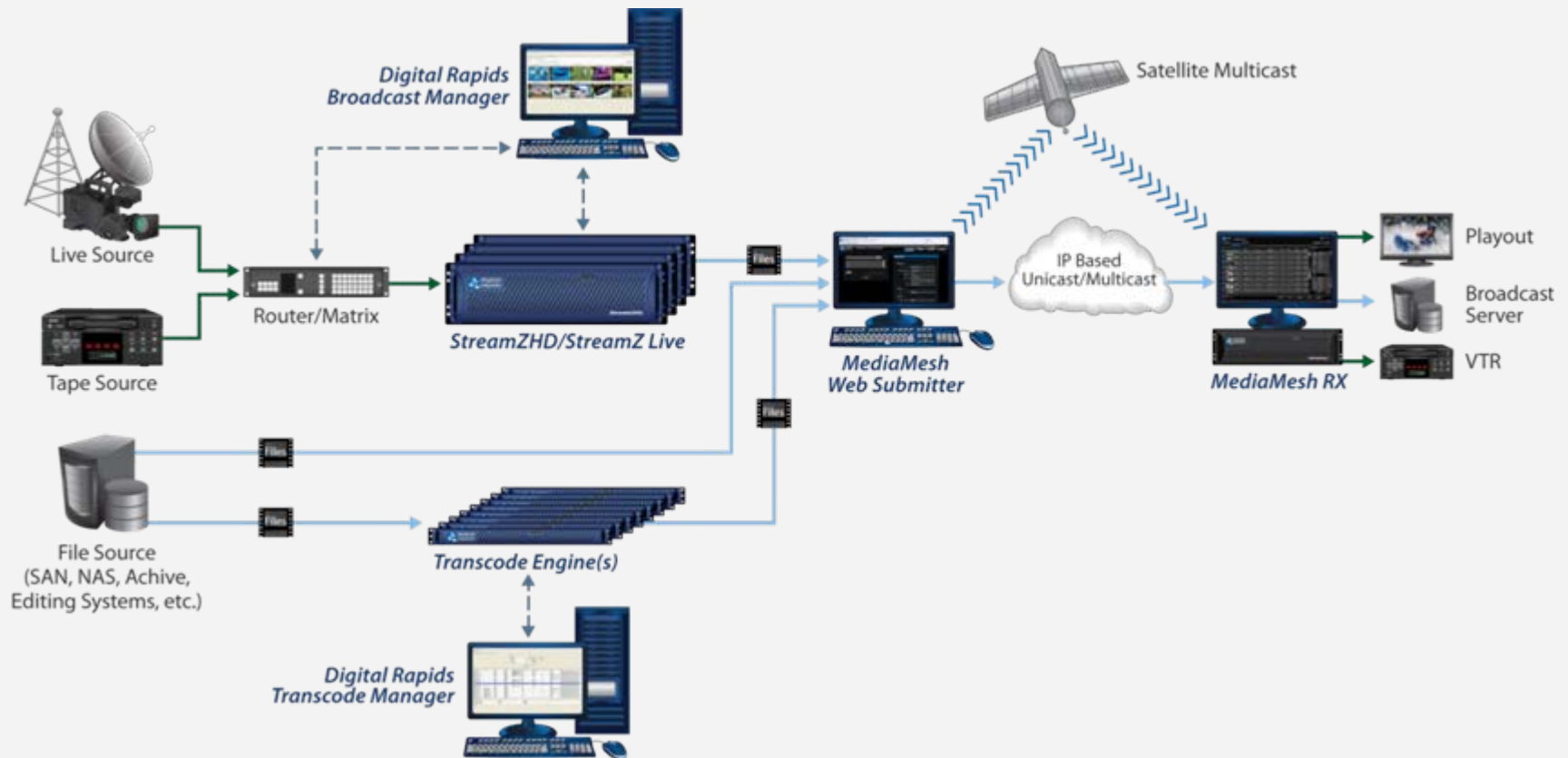
- Intuitive graphical interface
- Touch-screen and keyboard/mouse support

## Receiving – MediaMesh RX

- Inbox
  - Review, approve and re-request
  - Edit/manage metadata
  - Visual QC (on-screen, SDI)
- Inventory
  - Asset lifecycle management
- Flexible output from Inventory
  - Export to playout server
    - Re-wrapping/transcoding
  - HD/SD SDI playout (RX1000P and RX3000P models)
    - Manual or under automation control (VDCP)
    - Reinsertion of VANC
  - Print-to-Tape (with RS-422 control)
  - Repackage/transcode and forward (C2)



## Example MediaMesh Deployment Architecture



## Key Features and Benefits

- Efficient network-based digital delivery of HD, SD and D-Cinema content
- Increased automation and tremendous cost savings over traditional physical media distribution
- Flexible delivery models – satellite or IP multicast, IP unicast, and hybrid
- Fast, secure, reliable file transfers even over public Internet
- Easy submission through web-based portal
- Powerful, flexible, turnkey receiving appliances with integrated inventory management, visual QC, repurposing, packaging and playout
- Intuitive graphical interface for easy operation
- Integrated conformance bridges varying originating formats and recipient requirements

# Simplified High-Level Overview

