New Services over Cable Networks: System Requirements and Bandwidth Management

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Current Networks Services:

• Typical Services currently offered by most Cable TV Systems:
  - One way Service (Broadcast):
    ▫ Analog video

Two Way Services/Narrowcast:
  - Internet (cable modem)
  - Digital Video
New Network Services Coming soon to your Operation:

• New Services to be added now or in the future:
  – PPV (Pay Per View)
  – SDV (Switched Digital Video)
  – VOIP (Voice over Internet Protocol)
  – VOD (Video on Demand)
  – IPTV (additional TV program layer)
  – Narrowcasting (zoned program delivery)
• Directed Advertising
• Security Cameras
• Business
• Web Pages
• Energy Management & more
Bandwidth Requirements for Services:

- Typically each 6Mhz Channel has up to 38Mbps capacity (256 QAM)
- 1 Analog => 38Mbps / 6Mhz channel
- Digital: 38 Mbps per channel (2 to 12 SD/HD digital video services)
- Data services: Multiple channels for Downstream, 6Mhz= up to 38.4Mega/ channel, through Frequency re-usage (narrowcasting)
- PPV: One channel stream, watched by all, time set PPV= up to 19.2 megs
- VOD (Unicast): 1 channel stream is for one Subscriber 2-19 Megs/ channels (SD/HD- MPEG2 or MPEG4)
- VOICE: a few Kbps
- IPTV Services (Multicast): 1 stream is watched by all
  - MPEG 2: average ~ 5 Megs/ SD Channel
  - MPEG 2: 19.2 Megs / HD channel (not used in South America)
  - MPEG 4: 2 Mbps /SD Channel
  - MPEG 4: 8 to 10 Mbps /HD Channel
Bandwidth Capabilities of an HFC Network:

- Fiber Plant: virtually unlimited
- Coaxial: 38 Megs /channel x 135 = 5.2Ghz
- FFTX unlimited
- FFTX Platforms:
  - Fiber to the Node
  - Fiber to the Curb
  - Fiber to Building
  - Fiber to the Home
New 2 way Services=Network Changes

- Network required to change to a designed and engineered RF Signal Management (for both downstream and upstream):
  - Node splitting
  - Fewer Subscribers per node
  - More bandwidth required / node
  - More bandwidth required / home
  - Narrowcasting inputs
Future Bandwidth Management Issues

- Node size issues based on Narrowcasting and network expansion:
  - Increase number of nodes
  - Reduction of homes passed /Node
  - Increased bandwidth per node
  ⇒ Growing under demand, as long as new customers are acquired, and new services w/existing customers requires more and more bandwidth.

- RF Signal Management:
  - Advanced RF combining/Splitting requires plans
  - **High density splitting/ combining needs to be state of the Art – Integrated Solutions**
  - Service of RF Signal management is evolving
  - Nowadays HFC Networks are more Narrowcasting than Broadcasting
  - Combining and Splitting have become more Complex to allow the introduction of new digital services (growing under demand)
RF Signal Management:
Introducing New Services & offering more bandwidth

- New Services need to be added w/out Disrupting customers
- Interruptions are not acceptable anymore
- Full redundancy in Power Supplies and Amplifiers is critical for new services
- Installed Standalone units must provide free expansion in the number of inputs / outputs as penetration of new services increases
- New services drive will drive revenues and reduction of customer churn / stickability!
RF Signal Management Considerations For New Service Implementation:

- Integrated vs. Modular RF Signal Management devices
- High Isolation of input combining
- Excellent Return loss
- Amplifier gain to overcome losses after combining
- HAF/ HAR Amplifiers designed w/plug in EQ and pads
- High output signal levels capability
- Excellent frequency response and distortion Characteristics
- Status Monitoring of amplifiers, power supplies etc.
- Rack Space utilization and cost are paramount for advanced services
Continued.........

- Cost of product and implementation
- Reduced Installation Time
- Reduced Planning & Engineering Time
- Reduced System Down Time (no 3AM cutovers!)
- Reduced Maintenance Time w/ Easier, Faster Node splitting
- Reduce Points of Failure: Integrated units reduce the number of Cables, Connectors and Headend actives
- Future expansion of services without shutting down the system / customers
COMPARING A TYPICAL MODULAR RACK PROFILE vs. THE VIEWTEQ INTEGRATED SOLUTION FOR FORWARD PATH SIGNAL DISTRIBUTION

INTEGRATED SOLUTION SAVES SIGNIFICANT RACK SPACE VS. THE PREVIOUS MODULAR SYSTEMS
MFS-208 / Active Forward Path Distribution System

- Amplifier Module
- Power Supply Module
- Status LED’s and TP’s

- Output to a Single Laser
- Narrowcast to a Single Laser
- Narrowcast to All 8 Lasers This Unit Feeds
- Narrowcast to 4 Lasers on the A Side
- Narrowcast to 4 Lasers on the B Side
- System Input
- Narrowcast to a Single Laser
- Output to a Single Laser
INTEGRATED RETURN PATH COMBINING

- Each IRC combiner allows insertion of **16 Node inputs in 3Rack units**
- Flexible Combining groups include:
  - (3) 1:1 Outputs for each input (-16dB, -26dB, -26dB)
  - (8) 2:1 Groupings, 2 ports each (-26dB)
  - (4) 4:1 Groupings, 2 ports each (-26dB)
  - (2) 8:1 Groupings, 2 ports each, (-26dB)
  - **Same Unit handles from 8 to 1 Combining, to 1 to 4 Splitting!**
- Use IRC-316 to include 16:1 Groupings
- Customized Insertion loss characteristics upon request.
- **REDUCED NUMBER OF CABLES AND CONNECTORS**
NDU-8: Narrowcast Distribution Unit

- Single system input split to 8 outputs each output w/ 4 narrowcast combining inputs for additional services
- Add up to 4 separate narrowcast services, such as VOD, VoIP, HSD or ad insertions to each combining module
- Total signal loss for combining system input with narrowcast services: -17.5dB
- Excellent return loss & isolation specifications
- Front panel mounted test ports for broadcast input and each output
- All passive; can be stacked to save space
- 48-1002
RDU-8x4: Return Path Distribution Unit
RDU-4x8: Return Path Distribution Unit

- RACK Savings! 1RU Chassis,
- Equalized and ready for installation
- High Density design for Return Path Splitting
- Excellent port-to-port isolation (40dB)
- Low Insertion Loss
- Output test port (-20dB)
- High performance 'F' connectors
- Eliminates external connections
- 5-70 MHz bandwidth