Leveraging DOCSIS to Transport IP Video:
A Viable Methodology—After Solving the Challenges

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Using the Data Over Cable System Interface Specification (DOCSIS) to transport video over the Internet Protocol (IP) all the way into subscriber homes is a critical step cable operators need to take to optimize bandwidth. That's because linear television viewership continues to follow patterns that suit a one-to-many (broadcast or multicast) transmission medium. Studies prove the vast majority of subscribers are satisfied viewing just a relatively small number of program streams.

This fits in well with the DOCSIS shared-medium architecture—if the system is configured properly. All cable modems participating in the IP video service must share a common bonding group dedicated to carrying popular program streams in IP multicast groups. The dedicated channels should also support maximum utilization to create the smallest possible shared multicast bonding group to achieve optimal bandwidth efficiency.

Utilizing IP for video services is not new for cable operators. The protocol has been in play for about the past five years to distribute TV programs over Digital Subscriber Line (DSL) technology. Today, transport network technologies have been refined to provide acceptable video services using IP as a delivery method.

However, this was done generally without regard to the intricacies of the access network in the "last mile" into subscriber homes. This is primarily due to the significant investment operators made in Motion Pictures Expert Group (MPEG) video technology. Operators have thus been slower to adopt an IP video architecture for that last mile.

IP Transport Technology Set to Replace MPEG Technology

To provide managed video services to their subscriber base, nearly all operators now have plans to eventually replace MPEG transport technology with IP transport technology. The predominant way

to transport IP over a cable television network is to use equipment that supports DOCSIS. Unlike DSL, DOCSIS uses a shared medium yet still provides a rich set of tools to ensure Quality of Service (QoS). At the same time, using DOCSIS to transport IP video also presents several challenges:

- Maximizing stability and efficiency.

- Minimizing latency and perturbations.

- Configuring resources just once and as early as possible, ideally at initialization.

- Preventing service request activity (subscribers changing channels) from causing resource reconfigurations (channel assignments and bonding group changes).

Challenges like these can be addressed using system configurations that leverage the advantages of available technologies to minimize the required resources for providing IP video services. Cable operators can also apply several other best-practices to ensure optimal subscribe experiences when delivering IP video using DOCSIS. Here are a few examples:

- Use only cable modems and home gateways capable of receiving at least 24 downstream channels—and preferably 32 channels.

- Consolidate multicast group sessions into downstream channels smaller than the number of downstream receivers of the least-capable cable modem.

- Create bonding groups for all multicast sessions of entire channel sets—to allow for maximum bandwidth with minimum latency.

For linear TV streams that are nearly always viewed by a relatively large number of viewers at any one time, operators should also carry the streams over statically-provisioned multicast groups via the use of static multicast-session encoding. For program streams that are popular at least part of the time, significant bandwidth savings can be achieved by allowing these programs to be carried as a signaled group IP-multicast session.

The Criticality of Meeting Subscriber Demands

Why is the evolution to using DOCSIS to deliver IP video so critical? Subscribers demand video services that are immediately responsive to their inputs. To guarantee acceptable QoS, cable operators must deliver channel zapping times (the amount of time until video/audio for a new channel appears) that are instantaneous. Failing to meet this need could cause subscribers to turn to alternative sources of entertainment.

To learn more about the best practices that your company can leverage when using DOCSIS to transport IP video services, download the free ARRIS whitepaper—Configuration Recommendations for DOCSIS Transport of Managed IP Video Service. The paper also presents four sample IP video configurations based on using 32, 24, 16 and 8 downstream channel cable modems/home gateways. Each configuration can be used as a baseline and tweaked to suit your specific system needs.