

Motorola Simplifies Video Delivery

GPON for NAS-RAC and DAC Applications



Motorola's GPON RF Overlay Advantage

As opportunities continue to emerge for the profitable use of GPON networks, the cable industry is better positioned than many operators realize to exploit the technology to great advantage over competitors.

Operators need to be able to put GPON to use wherever demand for IP-based applications and services outpaces the broadband capacity on HFC networks. Rather than sharing 40, 80 or 120 Mega bits per second (Mbps) of data bandwidth over a DOCSIS serving area, operators can deliver up to 2 Gbps with an average of 80 Mbps downstream and 40 Mbps upstream to every premise in instances where the optical signal is passively split to 32 end points or they can achieve half that throughput over 64-way splits.

But they need to be able to provide RF video services over GPON as well. The key to making this possible at costs that allow for aggressive use of GPON lies with deployment of the Motorola solution in conjunction with use of existing Motorola video architecture.

Operators who deliver TV services using the Motorola Digital Addressable Controller (DAC) or its National Authorization Service – Regional Access Controller (NAS-RAC) can provide a full slate of residential as well as commercial services over Motorola's GPON far more cost effectively than is possible with other competing GPON solutions, including those that offer RF overlays to support TV service. Operators who deploy GPON in a Motorola-equipped video environment can interoperate seamlessly with the existing DCT, DCH and DCX set-top base, RF video components, headend gear and BSS and OSS systems without resorting to costly adjustments required to accommodate the extra wavelength that RF over Glass (RFoG) and the extra equipment that RF return solutions entail.

The fact that costs associated with GPON are much lower than many people expect, means that cable operators can be more aggressive in their deployments of the technology just as market conditions are expanding the case for all-optical access networks in multiple scenarios. Not only does the Motorola GPON platform assure operators higher ROI against initial deployment costs, but GPON makes an ongoing contribution to the bottom line through the operations costs savings that stem from maintaining and powering the line electronics on the coax portion of HFC. Field experience shows that a network service provider delivering residential triple-play services over GPON incurs Operations Expense

(OPEX) costs equivalent to just one to two percent of CAPital Expense (CAPEX), in contrast to OPEX costs on HFC plant, which typically run at six to ten percent of CAPEX.

Given these cost savings, Motorola's GPON platform is an obvious option for cable operators in virtually any scenario calling for deployment of all-optical access networks. This includes mixed use locations where the operator can maximize operations efficiencies by deploying GPON as the sole transport solution in a given service area, covering both commercial and residential customers requiring two-way video solutions.

GPON also provides operators an optimum approach to building network extensions in green field opportunities such as new subdivisions and planned communities and in brown field situations where there's a need for substantial rebuilding of cable plant without sacrificing their RF video offering including Switched Digital Video (SDV), Video On Demand (VOD) and Pay Per View (PPV). Deploying a low cost GPON network is the obvious choice for operators looking to leverage the great bandwidth advantages of optical networks that allow the ability to offer more services, more frequently.

Compatibility with Motorola DAC and NAS-RAC

The cost advantage of the Motorola GPON platform over other solutions rests in large part on the integrated SCTE-55-1 return path compatible with the Motorola's DAC and NAS-RAC video headend systems.

In larger cable systems operators equip headends with DACs to coordinate all aspects of the video programming service, including downstream and SCTE-55-1 return communications between Motorola set-tops and billing systems, applications servers and other system components.

Smaller cable systems, in conjunction with taking the digital video feed from Comcast® Media Center's Headend-in-the-Sky (HITS) service, rely on the Motorola NAS-RAC, which eliminates the need for putting DACs in headends and instead hosts DAC functions remotely through VPN connections to a DAC at Motorola's Satellite Access Control Center in San Diego CA. This includes support for decryption of HITS at the local headend, operation of switched digital video (SDV) components and handling of set-top communications for pay-per-view and video-on-demand applications using SCTE-55-1 return path communications.

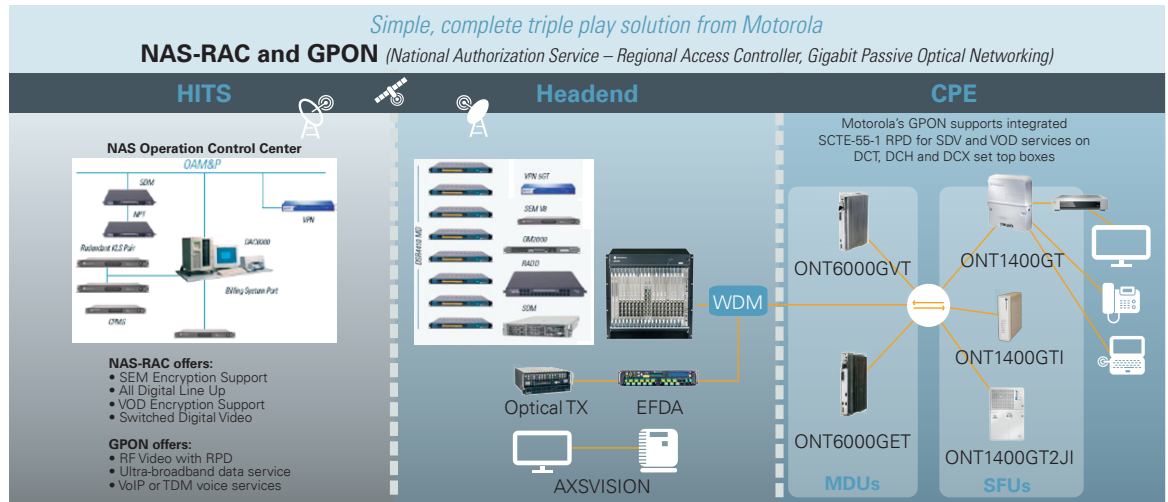


Figure 1

Nothing related to DAC or NAS-RAC video operations changes when operators implement the Motorola GPON platform (see Figure 1). The entire video architecture is preserved with no need to change out set-tops or add new components beyond the physical plant facilities that are required to implement GPON.

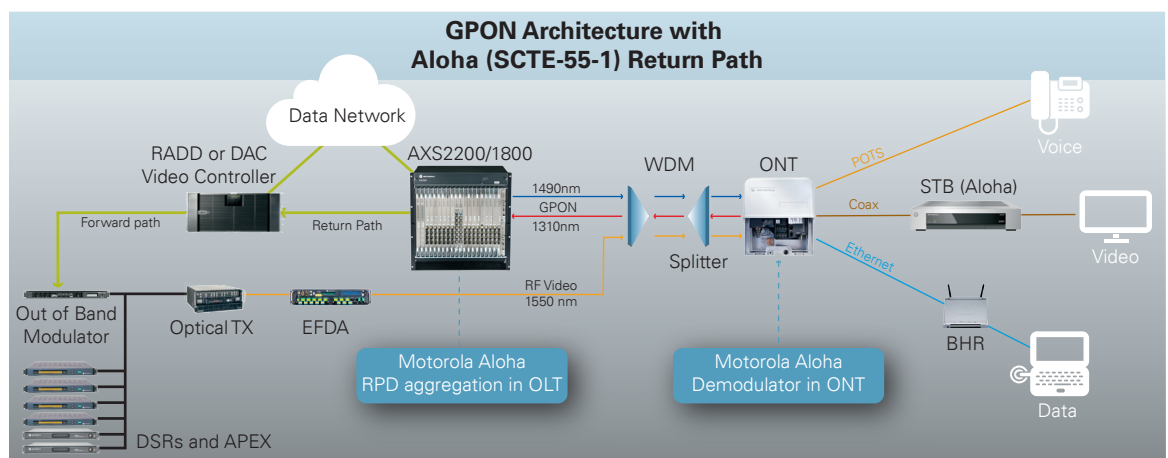
In the downstream, the GPON system interfaces with the video infrastructure by transparently transporting all services and out-of-band set-top communications over an RF optical overlay over the 1550 nm wavelength. These signals are optoelectronically converted at the premises-mounted optical network terminal (ONT) and passed transparently to set-tops over coaxial cable.

In the upstream direction, Motorola's (see Figure 2) ONT's demodulate the SCTE-55-1 Aloha RF return path signals from the set-tops and transmit them as standard GPON data packets over the PON network. Motorola's AXS2200/1800 Optical Line Terminal (OLT) then combines the packets and from all of the individual PONs and formats them for transmission

over 10/100 Base-T Ethernet port on the back of the chassis. This process emulates the Motorola Return Path Demodulator system so that the output from the AXS2200/1800 chassis appears to the video controller as if it originated from standard Motorola ARPD or RPD6000 return path demodulator. A big advantage of the integrated SCTE-55-1 approach found within Motorola's GPON system is that it virtually eliminates the return path collisions that can occur on traditional HFC or RFoG networks.

In Motorola's GPON system, the Aloha RF video return is converted to efficient digital packets and is sent in-band over the standard upstream 1310 nm wavelength used by GPON. Consequently Motorola's GPON system eliminates the need to carry the RF video return signal as a separate 1610 nm wavelength in RFoG based solutions or as demodulated RF baseband signal in other GPON solutions. GPON systems from other vendors require additional upstream equipment with attendant transmitters, receivers, filters and other conversion equipment to send the signal through to the headend video controller.

Figure 2



Summary

Motorola's GPON solution avoids the need to implement a separate RFoG or RF demodulation network to carry SCTE-55-1 Aloha return path signals from premises to the headend. Use of Motorola's GPON is the cost-effective solution wherever the local market conditions call for an all-optical two-way video triple-play solution based upon DCT, DCH and DCX set top boxes. With Motorola's GPON solution, operators gain the superior bandwidth and operations advantages of an all-optical network, eliminating the need to deploy additional equipment or sustain use of HFC plant to accommodate all users in the service area.

By seamlessly leveraging existing DAC and NAS-RAC architecture, end to end operators can add GPON incrementally on a pay-as-you-go basis, ensuring that all the new revenue opportunities that are emerging now and into the future achieve maximum ROI. As HFC plant obsolescence and market demand for ever more bandwidth combine to mandate wider use of GPON, operators who build video services on the Motorola platforms can be assured they have laid the foundation for the least costly migration path to GPON.



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