



ARRIS Access and Transport Solutions

Transform existing HFC systems into competitive and sustainable networks that increase capacity for future applications and additional subscribers



Access and Transport Solutions – Ways to add Capacity and Value to Cable Networks

In today's business climate, cable operators must have future-proofed, cost effective, scalable solutions that leverage existing infrastructure. They need viable and sustainable networks to generate new revenues, maximize ROI, and drive subscriber satisfaction. Faced with limited spending capability, cable operators must find creative ways to beat back competition which poses a threat to cable's dominance. Continued growth in residential services, and increased penetration into the small/medium business services market drives the need to increase capacity in cable networks.

Amongst the many tools available to the cable operator to increase network capacity, node segmentation, full-spectrum multi wavelength technologies, all fiber networks, and passive optical networks such as RFoG (RF over Glass) or Gigabit EPON (Ethernet over Passive Optical Networks) can be deployed easily, incrementally and cost-effectively. Node segmentation enables narrowcast capacity to be multiplied two- or four-fold for both downstream and upstream, and places no additional requirements on existing devices (Set Top Box, CMTS) concerning operating frequency range and modulation formats compared to other techniques such as bandwidth extension and higher order modulation. Full spectrum multi wavelength technologies address fiber scarcity, allow repurposing of existing fiber for different services, and are a good alternative to QAM overlay architectures for expansion of narrowcast services. If deployment of an all-fiber network is desired, for example, in a greenfield deployment, or to reduce the number of actives on a network that serves business subscribers, then RFoG can be used to support all cable services, including video and DOCSIS, using the same set-tops, cable modems and EMTAs, OSS/BSS systems, headend/hub equipment, and CMTS. Finally to help cable operators address small/medium businesses and residential power users with high-speed, symmetrical data services, Gigabit EPON can be deployed quickly, easily and incrementally once the PON infrastructure is in place., using existing DOCSIS based provisioning and billing backoffice functions.

Segmentation Solutions

ARRIS Opti Max 2 x 2 and 4 x 4 segmentable nodes (OptiMax 3100 and 4100)

For cable operators looking to add targeted services, the ARRIS Opti Max family of high-performance, 1 GHz segmentable optical nodes provide a flexible, cost-effective migration path to expanded capacity without laying additional fiber. With strand, wall, or cabinet mount configurations, the Opti Max family readily integrates with new or legacy HFC architectures and equipment to protect the MSO's investment while delivering cost-effective next-generation functionality. Opti Max is a full-featured product family offering high port-to-port isolation for superb quality, segmentation options from 2 x 2 to full 4 x 4 for flexibility and growth, and the most wavelengths available in the return path, maximizing existing fiber capacity.

Segmentable nodes are used to reduce service group sizes in order to provide different narrowcast content for each of the reduced groups. A 2 x 2 segmentable node will reduce a service group size by 50% and a 4 x 4 segmentable node will reduce a service group size by 75%. This segmentation can be done in the field incrementally as subscriber demand increases, to create more revenue generating services.

The modular design of the Opti Max segmentable and field-upgradable nodes provides a "pay as you grow" scalability, enabling MSOs to deploy minimal configurations today and expand easily as subscriber demand increases. The Opti Max family has the capability to upgrade many legacy amplifiers such as C-COR and Phillips and the Opti Max optical lid upgrades provide a low-cost way to quickly enhance service or to segment subscriber groups. Opti Max nodes are engineered for a fast, easy installation and maintenance: no special equipment and no extensive fiber plant evaluations are needed for plug and play segmentation. Opti Max nodes offer power and optical redundancy options that minimize downtime and maximize customer Quality of Service.



Multi Wavelength Solutions

CORWave Full Spectrum Multi Wavelength Technologies (CORWave and CORWave II Transmitters)

ARRIS understands the need to provide greater bandwidth capacity for more services, even in fiber scarce architectures, quickly and efficiently. The ARRIS CORWave multi wavelength forward transmitters allow up to 4 wavelengths in the 1310 nm transmission band to be carried over a distance of up to 25 km. CORWave II transmitters allow up to 16 wavelengths in the 1550 nm transmission band to be carried over distances up to 65 km. Solutions using CORWave technology enable;

- More wavelengths, more reach than comparable products on the market today
- Wavelength compatibility, allowing different services such as RFoG and EPON to coexist in the same physical plant with noticeably better performance, and minimal disruption when adding last mile services
- Fiber reclamation and wavelength reallocation for the addition of new services while maintaining the existing subscriber base
- Elimination or reduction of OTNs as an option to new fiber runs
- An alternative to QAM overlay architecture for the addition of narrowcast tiers, with the advantages of QAM overlay but without the constraints of narrowcast bandwidth and operational complexities such as optical rebalancing

Fiber Solutions

FTTMax RFOG Solutions

Cable operators wanting to offer bi-directional, triple-play services to smaller or medium-sized business and high-end residential users often find it difficult to cost-effectively and quickly extend their existing infrastructure while achieving a targeted Return on Investment. The ARRIS FTTMax RFoG solution delivers the same RF/DOCSIS/HFC services over an all-fiber network, with the added benefit of low noise characteristics which increase usable RF spectrum to 1 GHz in the downstream and allows more use of the 5-42 MHz return path spectrum for data in the upstream (due to reclamation of bandwidth in the reverse path that is normally lost to noise ingress). The ARRIS RFoG solution consists of a CHP-GMOD or CORWave II transmitter (depending on distance), a headend EDFA optical amplifier, an optical splitter that typically serves 32 subscribers and an RFoG Optical Network Unit (ONU) for each subscriber. The ONU converts the optical signal to RF at the subscriber premise. An optional TransMax optical field repeater can be deployed to increase both reach and fanout for distances beyond 20km and service groups up to 256 subscribers, The ONU detects when the CPE unit is transmitting and turns the return path laser on and off accordingly, avoiding signal collision. Therefore, no new CPE devices or provisioning systems are required when deploying an RFoG architecture, allowing MSOs to deploy services for new residential builds, small and medium businesses, or anywhere an all-fiber network is desired. The RFoG ONU is available with an optional PON passthrough port for the addition of gigabit speed data services if desired.

FTTMax EPON Solutions

For cost-effective delivery of high speed data services on an all-fiber network, the FTTMax EPON solution fits between DOCSIS bandwidth and Optical Ethernet capabilities. Designed to the IEEE standards (IEEE 802.3ah), the FTTMax Gigabit EPON provides 1 Gbps in the downstream and 1 Gbps in the upstream. It also supports a 'turbo-mode' feature that provides 2 Gbps in the downstream and 1 Gbps in the upstream. The Optical Line Terminal (OLT) is a single wide application module with 2 independent PON ports that fits into the ARRIS CHP Max 5000 chassis. The FTTMax Gigabit EPON OLT supports 32 to 64 subscribers per PON port. Two 1000base-T uplink ports interface to an external Layer2/3 switch for Wide Area Network (WAN) connectivity with QoS

The ARRIS DOCSIS Control Interface (DCI) provides translation and mapping between the DOCSIS and EPON management domains, allowing existing provisioning systems to detect the EPON ONUs seamlessly through the same provisioning systems used for cable modems. Various ONUs for differing services are also available including combinations of data, voice, RF video, and wireless LAN. A multi port PON terminal is also available with 24 copper or SFP Fast Ethernet ports and 2-4 10/100/1000Base-TX uplink ports for use in apartment buildings, multi-tenant complexes and for small/medium businesses.

Summary

ARRIS Access and Transport solutions facilitate node segmentation, narrowcast services, and network extensions to remote towns and anchor tenants, allowing cable operators to reduce operating costs, reduce service group sizes and provide higher bandwidth for a variety of special services to more customers. Operators now have ways to generate additional revenue from existing and new subscribers, capture cost sensitive customers, manage bandwidth and improve the end user's experience.

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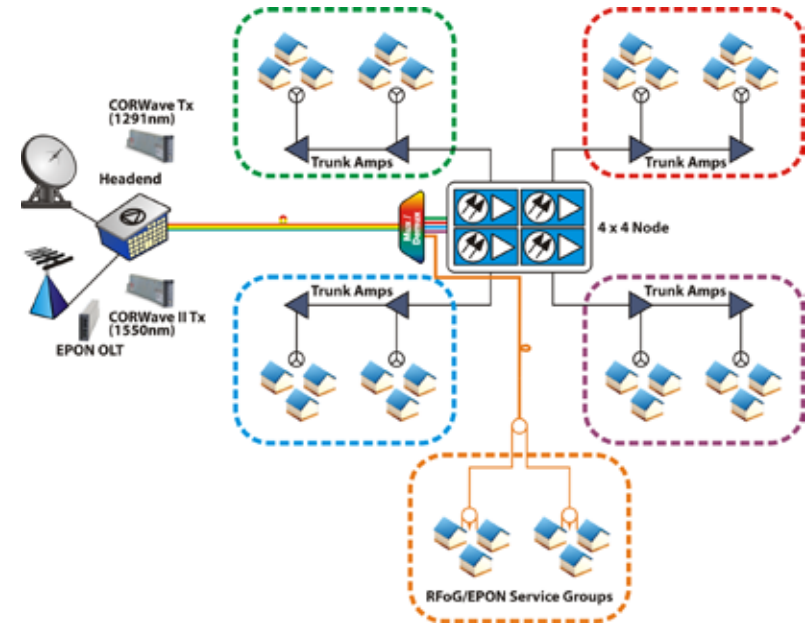


Diagram A: HFC architecture with 4 segmented service groups and RFoG/EPON services deployed over a single fiber using multi wavelength technology