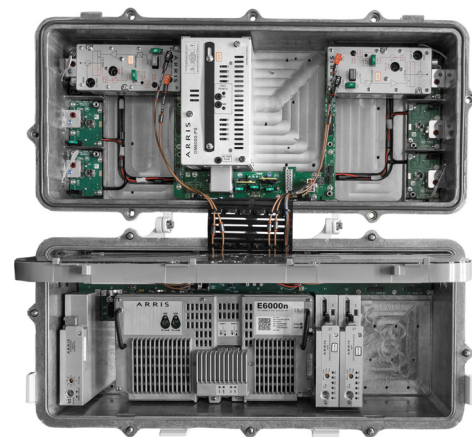


Opti Max™ Optical Node Series

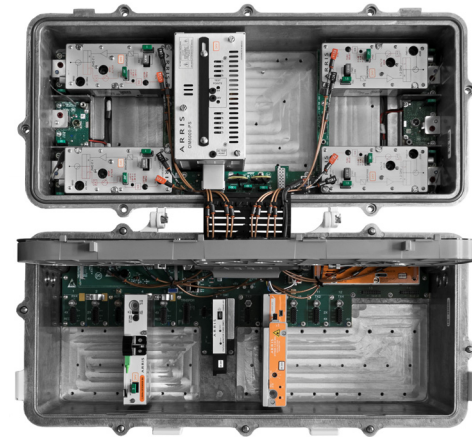
OM6000 GOA/GOT
Grey Optics Aggregator and
Grey Optics Terminating Nodes

FEATURES

- Features an industry-leading R-PHY solution for “pay as you grow” options to support future capacity demands
- Supports high output level capability for maximum service group size
- Drives fiber deeper into the network
- Supports upgrades to R-PHY configurations for additional capacity requirements without having to forklift
- Reduces deployment costs in low to medium density areas, expanding the homes passed per node area
- Pre-configured in the factory to support upstream and downstream operational requirements out of the box



GOA Node



GOT Node

PRODUCT OVERVIEW

As a complement to traditional DAA solutions, the ARRIS Grey Optics Aggregator (GOA) and associated Grey Optics Terminating (GOT) nodes form a cost-effective solution designed for low to medium density fiber deep deployments that allows operators to “pay as you grow” when customer demands require it. By deploying the GOA/GOT solution, operators can now realize the benefits of DAA and Fiber Deep operation by driving fiber deeper into the network and expanding the homes passed per node area, all while reducing deployment costs.

GOA/GOT—Overview

A standard Remote PHY network architecture requires each node to be equipped with an individual RPD, dedicated 10G fiber links, and vCore resources to support R-PHY operation. The GOA/GOT's aggregator-based network design, on the other hand, requires only the GOA node to be configured for R-PHY operation, rather than each node in the network. Once deployed, the GOA can then support up to eight sub-tended GOT nodes. As a result, only a single R-PHY configured fiber deep node is needed in the GOA/GOT network to expand the homes passed per node area and provide adequate network coverage. Instead of nine R-PHY configured fiber deep nodes servicing 30 homes each, for example, the same coverage can now be provided with one GOA node and up to eight GOT nodes. GOT nodes can be upgraded to direct RPD nodes as dictated by capacity needs, offering a futureproof solution for expanding and upgrading bandwidth. This flexibility provides operators with a pathway to bandwidth expansion without the need for solution forklift.

GOA Nodes

GOA/GOT nodes are based on ARRIS's current Opti Max OM6000 fiber deep node. The GOA node is equipped with an RPD device, a downstream analog transmitter, and two quad digital return receivers. The RPD will be serviced by a dedicated 10G fiber link for maximum digital performance. The downstream analog transmitter picks off RF signals immediately from the RPD output, which are optically split for transmission to each individual GOT node. The quad digital return receiver receives individual digital return signals from each GOT node and feeds the RPD combined RF signals from the GOT nodes and the GOA node's RF modules. Additionally, the GOA node provides up to two optional high level coaxial RF outputs to support homes near the GOA, which eliminates both the need to place additional nodes near the GOA to service those homes and the need for multiple, close-coupled enclosures.

The Remote PHY Device (RPD) is a key component in ARRIS's Distributed Access Architecture (DAA) portfolio, which can provide significant operational benefits—including increased bandwidth capacity, improved fiber efficiencies (wavelengths and distance), simplified plant operations with digital optics, and decreased loads on facility space and power systems—by extending the digital portion of the headend or hub to the node and placing the digital/RF interface at the optical/coax boundary.

To further simplify deployment, GOA nodes are pre-configured in the factory to support ease of installation. The modules, pluggable optics, pads, and equalizers included with each node support the network design's upstream and downstream performance requirements out of the box. Additional configuration is not typically required during the deployment process.

GOT Nodes

Each GOT node closely mirrors the traditional analog OM6000 nodes currently deployed in fiber deep networks. GOT nodes are factory-configured for 1x1 Fiber Deep operation, and include a 1.2 GHz optical receiver and 1-fer DT7030N digital return transmitter with a 4.2G 10 km SFP module. The GOT node provides four, high-level coaxial RF outputs to provide maximum RF coverage in the service area. Because GOT nodes leverage existing ARRIS fiber deep modules and form factors, they provide seamless, plug-and-play upgrade capability for stand-alone R-PHY node configurations. This modular design also allows operators to easily convert an existing OM6000 node to either a GOA or GOT configuration, or convert a GOT node to an RPD node. As the network grows, the ARRIS solution remains simplistic because of the flexibility of the solution's core modules.

Like GOA nodes, GOT nodes are pre-configured in the factory to support ease of installation. The modules, pluggable optics, pads, and equalizers included with each node support the network design's upstream and downstream performance requirements out of the box. Additional configuration is not typically required during the deployment process.

SPECIFICATIONS—GOA NODE

Node Configuration Two RF Amplifier Modules, one Power Supply, one Downstream Transmitter Module, two Quad Digital Return Receiver Modules, one GOA Downstream Configuration Module, one GOA Upstream Configuration Module, one I2C Multiplexer Card

Forward Path	Units	Specifications
RF		
Operational Bandwidth	MHz	102–1218
Flatness ¹	dB	± 1.5
Output Level	dBmV	+58 @ 1218 MHz (typical)
Operational Tilt	dB	21.0 ± 1.0 (102–1218 MHz) (typical)
Downstream Level Stability Over Temperature ²	dB	± 1.0
RF Output Test Points ³	dB	–20 ± 1.0
RF Output Return Loss ⁴	dB	16
Performance Specifications		
Channel Loading	—	148 ITU-T J.83 Annex B SC-QAM 256 + 1, 192 MHz OFDM Channel SC-QAM from 108-1002 MHz, OFDM from 1026 to 1218 MHz
MER	dB	41 (typical)
BER (Pre-FEC)	—	< 1E-06 (ITU-T J.83 Annex B SC-QAM 256)
Return Path	Units	Specifications
RF		
Operational Bandwidth	MHz	5–85
Flatness ¹	dB	± 1.0
Gain Slope	dB	0 ± 1.0
Upstream Level Stability Over Temperature ⁵	dB	± 1.0
RF Test Points ²	dB	–20 ± 1.0
RF Return Loss ^{4, 6}	dB	16
RF Path Loss ⁷	dB	0 ± 1.0
With ICS (–6 dB)	dB	6 ± 1.0
Without ICS (Off)	dB	> 30
Node Powering	Units	Specifications
Power Consumption	WAC	< 160
AC Input Voltage	Volts AC	44–90
AC Input Frequency Range	Hz	50/60
Hum Modulation ^{8, 9}	dBc	–60
AC Bypass Current ¹⁰	Ampere	15
Mechanical/Environmental	Units	Specifications
Dimensions	Inches	23.6 L x 11.0 W x 12.2 D
Weight	lb	< 50 lbs
Operating Temperature Range	C	–40° to +60°
	F	–40° to +140°
Required Accessories	Part Number	Description
RF Pads	NPB-xxx* *xx = 000–200 (0–20 dB)	Factory Installed in two RF modules. Not required for digital return setup. Customer can modify in 0.5 dB steps from 0–5 dB, and 1.0 dB steps from 5–20 dB, as required when purchased as an accessory item.
Linear Equalizers	EQ1220MHZ-** **xx = 00–12 (0–12 dB)	Factory Installed in two locations. Customer can modify in 1 dB steps as required when purchased as an accessory items.

SPECIFICATIONS—GOA MODULES

E6000n Remote PHY Module (RPD)	Units	Specifications
GOA Node Location	—	Lid Slots 3–10
RF Port Configuration	—	1 DS-SG x 1 US-SG
CIN Connectivity ¹¹	—	Dual 10 GbE SFP+
Downstream Bandwidth	MHz	108–1218
Upstream Bandwidth	MHz	5–85
Operating Tilt (1218/108 typical)	dB	9.5
RF Test Points (Upstream/Downstream)	dB	–20 ± 1.0
Downstream RF Output Level @ 1218 MHz	dBmV	49.5 (typical)
Nominal RF Upstream Input Level	dBmV/6 MHz	8
Downstream Transmitter	Units	Specifications
GOA Node Location	—	Lid Slot 1
Optical		
Optical Output Power	dBm	10 (typical)
Optical Wavelength Range	nm	1545–1562
Optical Connector	—	SC/APC 8 degree
RF		
Bandwidth Operational Range	MHz	52–1218
Response Flatness, P-V, min/max	dB	–1.0/1.0 dB (52 to 1218 MHz, typical)
Input Return Loss	dB	16
RF Input Test Point ¹²	dB	–20 ± 1.0
Performance		
Channel Loading	—	148 ITU-T J.83 Annex B SC-QAM 256 + 1, 192 MHz OFDM Channel, SC-QAM from 108-1002 MHz, OFDM from 1026 to 1218 MHz
Nominal RF Input Power	dBmV/channel	26
Typical Link Performance ¹³	—	2 km fiber link + passive loss @ 0 dBm Rx power
MER ¹⁴	dB	46 (typical)
BER (Pre-FEC)	—	1E-06 (ITU-T J.83 Annex B SC-QAM 256)
Power Consumption	WDC	< 7 (typical)
Quad Digital Return Receiver	Units	Specifications
GOA Node Location(s)	—	Lid Slot 11, Lid Slot 12
Optical		
Optical Input Power Range	dBm	0 to –16 (with RR4000-00-PI installed)
Number of Optical Interfaces	—	Four with two RR4000-00-PI pluggable receiver modules installed
Operating Wavelength Range	nm	1263.5–1617.5 (with RR4000-00-PI installed)
Optical Connector	—	LC/UPC
Optical Line Rate ¹⁵	Gbps	4.25
RF		
Bandwidth Operational Range	dB	5–85
Response Flatness ¹⁵	dB	± 0.5
Link Gain ¹⁶	dB	10 ± 1.0
Output Return Loss	dB	18
RF Input Test Point ¹⁷	dB	–20 ± 1.0
RF Output Attenuator Range	dB	0–20, 0.5 dB increments
Ingress Control ¹⁸	dB	0, –6, Off

SPECIFICATIONS—GOA MODULES CONTINUED

Quad Digital Return Receiver (cont.)	Units	Specifications
Link Performance¹⁵		
Nominal Loading	—	12, 6.4 MHz 64 SC-QAM Channels or 5-85 MHz Noise Loading
Nominal RF Input Level ¹⁹	dBmV/6 MHz	8
NPR Dynamic Range @ 40 dB ¹⁵	dB	17
Pre-FEC BER Dynamic Range @ 1E-6 dB ¹⁵	dB	29
Local Monitoring Interface	—	micro-USB; Supports local status monitoring and control via Opti-Trace CMS
Power Consumption	WDC	< 12, with two RR4000-00-PI pluggable receiver modules installed

NOTES:

- Measured with respect to tilt over the operating band of the node.
 - Measured to 23°C operational levels.
 - Measured with respect to the associated node port.
 - Measured at the node RF input and output port over the specified passband.
 - Measured from GOA node upstream input port to RPD RF input.
 - Return loss is 15 dB from 5-15 MHz when ICS is installed in the node.
 - At 25°C. Gain measured across bandwidth.
 - Over the operating temperature range.
 - Measured from 0-15A, de-rate to 55 dBc from 5 to 10 MHz.
 - Maximum total current applied.
 - Requires 95°C SFP+ operating temperature. TTD45xx series SFP+ modules are recommended.
 - RF Input test point -20 ± 1.5 dB over full temperature range; RF input attenuator set to 0 dB.
 - Link performance specified with GOT Forward Path Receiver.
 - MER corrected for source contribution. Measured with a signal source with MER greater than 44 dB and a signal analyzer with MER measurement capability greater than 46 dB MER.
 - When using the DT7030N 1-fer 85 MHz digital return transmitter in a single wavelength configuration.
 - From DT7030N input to DR4485N RF Output with 0 dB Attenuation.
 - With output attenuator set to 0 dB; RF input test point switchable via rotary switch positions RX1, RX2, RX3, RX4.
 - Selectable for individual upstream RF paths via Opti-Trace CMS or RPD module.
 - References the nominal RF input level for the DT7030N 1-fer 85 MHz digital return transmitter.
- Specifications are compliant with the applicable, recommended ANSI/SCTE test methods.
All specifications are stated as worst-case over temperature unless otherwise noted.

SPECIFICATIONS—GOT NODE

Node Configuration Four RF Amplifier Modules, one Power Supply, one 1.2 GHz receiver module, one digital return transmitter with 10 km SFP+ module, one GOT Downstream Configuration Module, one GOT Upstream Configuration Module

Forward Path	Units	Specifications
RF		
Operational Bandwidth	MHz	102–1218
Flatness ¹	dB	± 1.0
Output Level	dBmV	+58 @ 1218 MHz (typical)
Operational Tilt	dB	21.0 ± 1.0 (102–1218 MHz) (typical)
Downstream Level Stability Over Temperature ²	dB	± 1.5
RF Test Points ³	dB	-20 ± 1.0
RF Output Return Loss ⁴	dB	16
Performance Specifications⁵		
Channel Loading	—	148 ITU-T J.83 Annex B SC-QAM 256 + 1, 192 MHz OFDM Channel SC-QAM from 108-1002 MHz, OFDM from 1026 to 1218 MHz
MER	dB	39.0 (typical)
BER (Pre-FEC)	—	< 1E-06 (ITU-T J.83 Annex B SC-QAM 256)

SPECIFICATIONS—GOT NODE CONTINUED

Return Path	Units	Specifications
RF		
Operational Bandwidth	MHz	5–85
Flatness ¹	dB	± 1.0
Gain Slope	dB	0 ± 1.0
Upstream Level Stability Over Temperature ⁶	dB	± 1.5
RF Test Points ³	dB	–20 ± 1.0
RF Output Return Loss ^{3, 7}	dB	16
RF Path Loss ⁸	dB	0 ± 1.0
Nominal Return Input Level ⁷	dBmV	8 dBmV/6 MHz; 5–85 MHz
Node Powering		
Power Consumption	WAC	< 135
AC Input Voltage	Volts AC	44–90
AC Input Frequency Range	Hz	50/60
Hum Modulation ^{10, 11}	dBc	–60
AC Bypass Current ¹²	A	15
Mechanical/Environmental		
Dimensions	Inches	23.6 L x 11.0 W x 12.2 D
Weight	lb	< 50 lbs
Operating Temperature Range	C F	–40° to +60° –40° to +140°
Required Accessories		
RF Pads	NPB-xxx* *xxx = 000–200 (0–20 dB)	Factory Installed in two RF modules. Not required for digital return setup. Customer can modify in 0.5 dB steps from 0–5 dB, and 1.0 dB steps from 5–20 dB, as required when purchased as an accessory item.
Linear Equalizers	EQ1220MHZ-** **xx = 00–12 (0–12 dB)	Factory Installed in two locations. Customer can modify in 1 dB steps as required when purchased as an accessory items.

SPECIFICATIONS—GOT MODULES

Optical Receiver	Units	Specifications
Optical Wavelength	nm	1260 to 1620
Optical Input Power Range, continuous	dBm	–4.0 to +3.0
Optical Connector Type	—	SC/APC
Optical Test Point	Volt/mW	1 ± 10%

SPECIFICATIONS—GOT MODULES CONTINUED

Digital Return	Units	Specifications
General		
Pluggable Optics	—	TKA1310-TL10 (one module installed in factory)
Optical Interface Connectors	—	LC duplex on SFP
Optical Transmission Bit Rates	Gbps	4.25
Number of RF Channels	—	1-fer, 1x85 MHz
RF		
Operational Bandwidth	MHz	5–85
Input Return Loss	dB	16 (minimum)
System Full Gain	dB	10 ± 1.0 (to DR4485 quad digital return receiver)
Input Test Point	dB	–20 ± 1.0
Frequency Response	dB	± 0.5
Distortion¹³		
Nominal Loading	MHz	5–85
Nominal Input	dBmV/6 MHz	8
NPR Dynamic Range @ 40	dB	17
BER Dynamic Range @ 1.E-06	dB	29

NOTES:

1. Measured with respect to tilt over the operating band of the node.
 2. Referenced to 23°C operating levels when connected to a GOA node.
 3. Measured with respect to the associated node port.
 4. Measured at the node RF input and output port over the specified passband.
 5. Measured when connected via 2 km fiber to a GOA node operating with a –1 dBm Rx.
 6. Measured from GOT node upstream input port to GOA RPD RF input.
 7. Return loss is 15 dB from 5-15 MHz when ICS is installed in the node.
 8. At 25°C. Gain measured across bandwidth.
 9. Loading at node port and digital return module.
 10. Over the operating temperature range.
 11. Measured from 0–15 A, de-rate to 55 dBc from 5 to 10 MHz.
 12. Maximum total current applied.
 13. Tested with DR4485 quad digital return receiver. Single wavelength performance (one DT7030N-85 to the DR4485).
- Specifications are compliant with the applicable, recommended ANSI/SCTE test methods.
All specifications are stated as worst-case over temperature unless otherwise noted.

RELATED PRODUCTS

E6000® CCAP Core	Optical Passives
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Customer Care

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Note: Specifications are subject to change without notice.

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