

- True universal EdgeQAM, able to support VOD, SDV, BCST and M-CMTS services concurrently
- High density, modular 2-RU system capable of hosting up to nine QAM RF output modules
- Hot swappable QAM RF modules containing 2 RF ports capable of outputting up to 4 QAM channels each
- Dual redundant, load sharing power supplies
- Processing module with three GbE ports supporting both copper and/or FO links
- DOCSIS 3.0 ready
- Controlled via NMIX Digital Service manager, Mass Configuration Tool (MCT), or HTTP web GUI as a stand-alone device
- DVB Simulcrypt support
- Motorola Privacy Mode support

The Network Services Gateway™ 9000 is a high density Universal EdgeQAM system, capable of reaching up to 72 QAM RF outputs per unit. The system is designed as a highly integrated digital video gateway which multiplexes on-demand content streamed over an IP network. The NSG 9000 was engineered for scalability; it is capable of growing in QAM density from 1 to 72 QAMs per unit. In addition to providing unparalleled output density, the NSG 9000 is designed to support a variety of applications including Video on Demand (VOD), Switched Digital Video (SDV), Broadcast, Modular Cable Modem Termination System™ (M-CTMS) and Direct to Edge (D2E) concurrently.



STREAM PROCESSING

The NSG 9000 is housed in a modular, 2-RU chassis, and performs PID filtering, multiplexing, scrambling, QAM modulation, and RF upconversion for up to 72 MPEG transport streams simultaneously. The NSG accepts digital MPEG input through its gigabit Ethernet (GbE) ports, then directs the multimedia to different QAMs to create the outgoing transport streams as QAM-RF output signals. The NSG 9000 is also designed to meet the DOCSIS 3.0 M-CTMS requirements for downstream data transmission.

The processing module features three 1000base-T ports as well as three SFP cages for optical fiber interfaces. The processing module also includes two 10/100Base-T ports for management and conditional access networks. In addition, this module optionally supports two DOCSIS Timing Interface ports (DTI) for synchronizing the clocks in an M-CMTS application. An on-board ASI monitoring port is used to monitor the transport streams within the system with an MPEG analyzer.

MODULARITY

In order to maximize scalability and flexibility, the NSG 9000 is designed as a completely modular system. The chassis is fitted with a passive backplane, while all the processing and modulation functions are performed on retrievable modules. The chassis has nine QAM RF module slots; each module has two QAM RF ports, and each port is capable of supporting up to 4 adjacent and/or non-adjacent QAM channels on Annex A, B and C. The system can host two AC or DC power supplies, which are redundant to each other.

Designed for ease of operation, the NSG 9000 QAM RF modules and power supplies are hot-swappable, allowing for flexible enhancement of the system density without service down-time. The device cooling fans are contained in a detachable front bezel which snaps on the chassis, allowing field replacement.

- Video-on-demand (VOD)
- Switched digital video (SDV)
- Broadcast applications
- Modular CMTS
- Direct to Edge (D2E)

MANAGEMENT

The NSG 9000 offers several methods of configuration and monitoring. Each system comes with an on-board server for web-based control. The GUI supports all of the NSG's configuration and monitoring functionality, and can be accessed with an Internet browser. The NSG also supports a local control panel, which consists of an LCD display area and a keypad.

In order to facilitate the simple and simultaneous configuration of a large number of NSG systems, Harmonic offers a spreadsheet-based Mass Configuration Tool (MCT). This tool also allows users to perform firmware upgrades and remote configuration as well as backup and restoration for multiple devices.

In addition, the NSG 9000 supports in-depth monitoring, control, utilization statistics and alarm aggregation via Harmonic's NMX Digital Services Manager. The NSG 900 supports various standard and proprietary SNMP MIBs, and thus its status, alarms, statistics and utilization can be monitored using any SNMP-compliant management platform.

BENEFITS OF THE NSG 9000

- **High Density** – Supporting up to 72 QAMs per 2-RU unit, the NSG 9000 is capable of supporting more than 1000 concurrent VOD streams, depending on the bit-rates.
- **Flexibility** – Each NSG 9000 can scale from one to 72 QAM RF outputs, and is ideal for a variety of applications, including VOD, switched digital video, broadcast and data.
- **Performance** – The NSG 9000 supports the same high performance standard of the existing NSG family, with superior RF specifications, stream processing functionality and management options.
- **Modular Design** – The NSG 9000 platform features hot swappable modules and power supplies, a retrievable processing module and detachable front panel.
- **Reliability** – The system supports dual redundant load-sharing power supplies, cast-aluminum covered QAM RF modules and a robust chassis design, all designed to provide high reliability and superior performance over time.
- **Network Management** – The NSG can be managed via a web-based GUI, Mass Configuration Tool (MCT), Harmonic's NMX Digital Services Manager, an SNMP compliant management platform, or a local control panel.

GIGABIT ETHERNET INPUT

Type	Gigabit Ethernet 802.3z
Ports	3 Independent ports
Connector	3 x 1000Base-T, RJ45 ports 3 x SFP cages
I/O Speed	1 x 960 Mbps per port
IP Encapsulation	MPEG TS over UDP/IP/MA 1 to 7 TS/ IP
MPEG Format	188 Bytes per TS packet
I/O Processing	Up to 960 Mbps per port
Addressing & Protocol	Unicast (UDP, L2TPv3), Multicast (IGMPv1,v2,v3)
Management	ARP, ICMP
Monitoring	GbE port forwarding

ASI MONITOR PORT

Type	ASI Output
Connector	BNC, 75Ω
Configuration	Configurable mirroring per QAM
MPEG Format	188 Bytes per TS packet

MANAGEMENT INTERFACES

Ethernet	2 x 10/100Base-T
Connector	RJ-45 (1 Management, 1 CAS)
Serial Port	RS232 (Reserved for factory use)

RE-MULTIPLEXING

PID	Re-mapping & remultiplexing
PSI/SI	Extraction PAT/PMT Generation

MANAGEMENT

NMS	Harmonic NMX Digital Service Manager (monitoring only)
Standalone Control	NSG Web-client
Mass Configuration	Mass Configuration Tool (MCT)
Protocols	TCP/IP SNMP v1,v2c,v3 HTTP, FTP

ENVIRONMENTAL

Operating Temperature Range	0° to 50 °C 32° to 122 °F
Storage Temperature Range	-20° to +80 °C -4° to +176 °F
Relative Humidity	0 to 95% non-condensing
Operating Altitude	Up to 4,572 meters (15,000 feet)
Storage Altitude	Up to 12,192 meters (40,000 feet)

PHYSICAL

Input Voltage	85-264 VAC, 47-63 Hz 36-72V VDC
Typical Power Consumption	482W @ 220VAC 492W @ 110VAC 450W@-48VDC
Power Modules	1+1 redundant AC/DC, load sharing power supplies
Rack Space	2-RU
Dimensions (WxHxD)	19" x 3.47" x 20.75" 48.26 cm x 8.81 cm x 52.7 cm
Weight	
Chassis and processing board	15.4Kg/34 lb
Power supplies	1.8Kg/3.9 lb
RF Module	1.0Kg/2.2 lb

QAM RF

RF Module Type	NSG-2R		NSG-2R1G	NSG-8R1G
Connector	F-Type, 75 Ω			
Ports	2 RF ports per module			
RF Output Level	+62 dBmV @ 1 channel			
	+59 dBmV @ 2 channels			
	+57.2 dBmV @ 3 channels			
	+56 dBmV @ 4 channels			
Center RF Frequency Range (Annex B, C)	53MHz to 867MHz, ±3kHz, 1kHz steps	53MHz to 999MHz, ±3kHz, 1kHz steps	53MHz to 999MHz, ±3kHz, 62.5kHz steps	
Center RF Frequency Range (Annex A)	54MHz to 866MHz, ±3kHz, 1kHz steps	54MHz to 998MHz, ±3kHz, 1kHz steps	54MHz to 998MHz, ±3kHz, 62.5kHz steps	
QAM Constellations	16, 32, 64, 128, 256			
Bandwidth	6MHz or 8MHz			6MHz or 8 MHz ; 5.65MHz to 8MHz
QAM Density Per Port (Annex B, C)	1, 2 or 4 adjacent QAM channels			1, 2, 3, 4 semi-flexibly located QAM channels
QAM Density Per Port (Annex A)	1, 2 or 3 adjacent QAM channels			1, 2, 3, 4 semi-flexibly located QAM channels
QAM Encoding	ITU-T J.83 Annex A (DVB), B, C (Japan)			
RF Output Power Adjustment Range	15 dB in 0.1 dB steps	12 dB in 0.1 dB steps		
Output Return Loss	14 dB			

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