ASTRO Radio System

Transport Network Equipment Specifications

ASTRO radio systems are designed to provide mission-critical communications with always available communication and maximum flexibility for configuration. The networking equipment that interconnects equipment within and between ASTRO sites must deliver on that promise. This document lists the specifications of the various components used to make up the ASTRO transport network.

MOTOROLA SOLUTIONS

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Routers & Firewalls

Routers are used to interconnect between ASTRO physical sites including ASTRO system cores, primary sites, RF radio and repeater sites, dispatch sites and more. Firewalls within the routers protect the ASTRO site equipment from illicit intrusion

Juniper SRX1500 Router and Firewall
Juniper SRX1500 routers are deployed in pairs at ASTRO Core, Prime and hub sites.

Juniper SRX345 Site Router and Firewall
Juniper SRX345 routers are deployed in pairs at ASTRO RF, repeater, dispatch and network management sites.

SPECIFICATIONS		
PHYSICAL AND ENVIRONMENT	**SRX345**	**SRX1500**
Form factor	1 RU	
Dimensions (W x H x D)	17.36 x 1.72 x 14.57 in. (44.09 x 4.36 x 37.01 cm)	17.5 x 1.75 x 18.2 in (44.45 x 4.44 x 46.22 cm)
Weight	10.80 lb (4.90 kg)	16.1 lb (7.30 kg)
Operating temperature	32° to 104° F (0° to 40° C)	
Non-operational temperature	4° to 158° F (-20° to 70°)	
Operating humidity	10% to 90% non-condensing	
Non-operational humidity	5% to 95% non-condensing	
FCC classification	Class A	
RoHS compliance	RoHS 2	
Common criteria certification	NDPP, VPNEP, FWEP, IPSEP	NDPP, VPNEP, FWEP, IPSEP
ELECTRICAL		
Redundant PSU	Yes	1+1
Power supply	AC (internal)	AC/DC (external)
Maximum current consumption	1.364 A	2.5A (for AC PSU) 6.2A (for DC PSU)
Average power consumption	122 W	150 W
Average heat dissipation	420 BTU/h	614 BTU / hour
CONNECTIVITY		
Total onboard ports	16x1GbE	16x1GbE and 4x10GbE
Onboard RJ-45 port	8x1GbE	12x1GbE
Onboard small form-factor pluggable (SFP) transceiver ports	8x1GbE	4x1GbE
Onboard SFP+ ports	16x1GbE	4x10GbE
Out-of-band (OOB) management ports	1x1GbE	1x1GbE
Dedicated high availability (HA) ports	4	1x1GbE (SFP)
PIM slots	1	2
Console (RJ-45 + miniUSB)	1	1
USB 2.0 ports (type A)	0	1

LAN Switches

Local Area Network (LAN) switches provide the connections that allow local servers, clients, routers and other IP components to share information within a site. ASTRO radio systems support both Juniper EX4100-F and HPE Aruba 2930F Ethernet switches deployed in paired configurations for redundancy. The Juniper EX4100F LAN switches come in 24 or 48 port capacity.

Juniper EX4100-F-24T Ethernet Switch

Juniper EX4100-F-48T Ethernet Switch

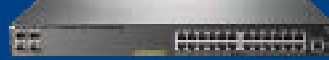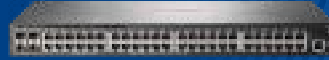| SPECIFICATIONS		
GBE PORT DENSITY	**EX4100-F-24T**	**EX4100-F-48T**
	24 1GbE host ports 4 10GbE/25GbE ports 4 1GbE/10GbE ports	**48 1GbE host ports 4 10GbE/25GbE ports 4 1GbE/10GbE ports**
PHYSICAL AND ENVIRONMENTAL SPECIFICATIONS		
Dimensions (W x H x D)	17.36 x 1.72 x 15.05 in (44.1 x 4.37 x 38.24 cm), 1U height	
Weight (w/ power supply & fan module)	11.31 lb (5.13 kg)	
Operating temperature	32° to 113° F (0° to 45° C)	
Operating relative humidity	5% to 90% (non-condensing)	
Storage temperature	-40° to 158° F (-40° to 70° C)	
ELECTRICAL		
Voltage operating range	100-120 V/200-240 VAC	
Maximum current inrush	30A	
SAFETY AND COMPLIANCE		
Electromagnetic Compatibility (EMC) requirements	FCC 47 CFR Part 15 ICES-003 / ICES-GEN EN 300 386 V1.6.1 EN 300 386 V2.1.1 EN 55032 CISPR 32 EN 55024 CISPR 24 EN 55035 CISPR 35 IEC/EN 61000 Series AS/NZS CISPR 32 VCCI-CISPR 32 BSMI CNS 13438 KN 32 and KN 35 KN 61000 Series TEC/SD/DD/EMC-221/05/OCT-16 TCVN 7189 TCVN 7317	
Environmental	Reduction of hazardous substances (ROHS) 6/6	

HPE Aruba 2930F Ethernet Switches

ASTRO radio systems support 4 different Aruba Ethernet switches depending on the capacity requirements and organization feature requirements.

Aruba 2930F 24G 4SFP+ Switch (JL253A)

Aruba 2930F 48G 4SFP+ Switch (JL254A)

Aruba 2930F 24G PoE+ 4SFP+ T Switch (JL263A)

Aruba 2930F 48G PoE+ 4SFP+ T Switch (JL264A)

SPECIFICATIONS

I/O PORTS AND SLOTS	ARUBA 2930F 24G 4SFP+ SWITCH (JL253A)	ARUBA 2930F 48G 4SFP+ SWITCH (JL254A)	ARUBA 2930F 24G POE+ 4SFP+ T SWITCH (JL263A)	ARUBA 2930F 48G POE+ 4SFP+ T SWITCH (JL264A
	24 RJ-45 autosensing 10/100/1000 ports (IEEE 802.3 Type 10BASE-T, IEEE 802.3u Type 100BASE-TX, IEEE 802.3ab Type 1000BASE-T); Duplex: 10BASE-T/ 100BASE-TX: half or full; 1000BASE-T: full only	48 RJ-45 autosensing 10/100/1000 ports (IEEE 802.3 Type 10BASE-T, IEEE 802.3u Type 100BASE-TX, IEEE 802.3ab Type 1000BASE-T); Duplex: 10BASE-T/ 100BASE-TX: half or full; 1000BASE-T: full only	24 RJ-45 autosensing 10/100/1000 PoE+ ports (IEEE 802.3 Type 10BASE-T, IEEE 802.3u Type 100BASE-TX, IEEE 802.3ab Type 1000BASE-T, IEEE 802.3at PoE+); Duplex: 10BASE-T/100BASE-TX: half or full; 1000BASE-T: full only	24 or 48 RJ-45 autosensing 10/100/1000 PoE+ ports (IEEE 802.3 Type 10BASE-T, IEEE 802.3u Type 100BASE-TX, IEEE 802.3ab Type 1000BASE-T, IEEE 802.3at PoE+); Duplex: 10BASE-T/100BASE-TX: half or full; 1000BASE-T: full only
	4 SFP+ 1/10GbE ports; PHY-less	4 SFP+ 1/10GbE ports; PHY-less	4 SFP+ 1/10GbE ports; PHY-less	4 SFP+ 1/10GbE ports; PHY-less
ADDITIONAL PORTS AND SLOTS				
	1 dual-personality (RJ-45 or USB micro-B) serial console port			
PHYSICAL AND ENVIRONMENTAL SPECIFICATIONS				
Dimensions (W x H x D)	17.42 x 1.73 x 7.88 in, 44.25 x 4.39 x 20.02 cm	17.42 x 1.73 x 9.7 in, 44.25 x 4.39 x 24.63 cm	17.42 x 1.73 x 12.77 in, 44.25 x 4.39 x 30.42 cm	
Weight (w/ power supply & fan module)	5.31 lb (2.41 kg)	6.83 lb (3.10 kg	44.25 x 4.39 x 20.02 cm	44.25 x 4.39 x 20.02 cm
Operating temperature range	32°F to 113°F (0°C to 45°C); up to 5,000 Feet 32°F to 104°F (0°C to 40°C); up to 10,000 Feet			
Operating relative humidity	15% to 95% @ 104°F (40°C), non-condensing			
Storage temperature range	-40°F to 158°F (-40°C to 70°C); up to 15000 Feet			
Storage humidity	15% to 95% @ 149°F (65°C)			
ELECTRICAL				
Frequency	50/60 Hz			
Maximum heat dissipation	100.0 BTU/hr (105.5 kj/hr)	157.2 BTU/hr (165.8 kj/hr)	258.0 BTU/hr (272.2 kj/hr)	293.0 BTU/hr (309.1 kj/hr)
Voltage operating range	100 - 127 / 200 - 240 VAC, rated			
Current	0.6/0.4 A	0.9/0.6 A	4.9/2.4 A	5.1/2.5 A
Maximum power rating	29.3 W	46.6 W	445 W	459 W

SPECIFICATIONS CONTINUED				
SAFETY	ARUBA 2930F 24G 4SFP+ SWITCH (JL253A)	ARUBA 2930F 48G 4SFP+ SWITCH (JL254A)	ARUBA 2930F 24G POE+ 4SFP+ T SWITCH (JL263A)	ARUBA 2930F 48G POE+ 4SFP+ T SWITCH (JL264A
	UL 60950-1: 2nd Edition; UL 62368-1: 2nd Edition; EN 60950-1:2006 +A11:2009+A1:2010 +A12:2011+A2:2013; EN 62368-1: 2nd Edition; IEC 60950-1:2005 +A1:2009 +A2:2013; CSA 22.2 No. 60950-1-072nd; IEC-62368-1: 2nd Edition; EN 60825-1:2014 / IEC 60825-1:2014 Class 1			
EMISSIONS				
	EN 55032:2012/CISPR 32 Class A; FCC CFR 47 Part 15 Class A; VCCI Class A; ICES-003 Class A; CNS 13438			
IMMUNITY				
Generic	EN 55024:2010/CISPR 24			
ESD	IEC 61000-4-2			
Radiated	IEC 61000-4-3			
EFT Burst	IEC 61000-4-4			
Surge	IEC 61000-4-5			
Conducted	IEC 61000-4-6			
Power frequency magnetic field	IEC 61000-4-8			
Voltage dips and interruptions	IEC 61000-4-11			
Harmonics	IEC/EN 61000-3-2			
Flicker	IEC/EN 61000-3-3			

Gateways

Gateways are used when information or data needs to be converted from one protocol to another. ASTRO radio systems utilize gateways when commercially available routers are not able to provide the interface required.

GGM 8000 Gateway

The ASTRO GGM 8000 Gateway is a multi-purpose network communications platform, constructed to interconnect devices and networks within ASTRO radio systems. The need for special protocols, including multicast, are eliminated with static tunnels through your backhaul network. GGM 8000 is supported as a border router and GGSN for new radio systems and site/core router and CCGW for previously deployed systems.

SPECIFICATIONS	
CONFIGURATION	
Base Platform Configuration	Enclosure; Power Subsystem (AC or DC); Base Module; Console Management Port (9 Pin); Four 10/100/1000 Base-T Ethernet Ports; Two T1/E1 WAN Telecommunication Ports; Encryption Support (disabled)
Optional Modules	Encryption enabling certificate Analog 4 wire/v.24 Conventional Gateway Module: 4x4wire with E&M analog ports, 4xv.24 digital ports Enhanced Low Density Conventional Gateway Module: 4x2 (or X4) wire with E&M analog/IO ports, 4xv.24 digital ports Enhanced High Density Conventional Gateway Module: 8x2 (or X4) wire with E&M analog/IO ports, 8xv.24 digital ports FlexWAN Module: 1 multipurpose port, typically used for v.35 interface
PHYSICAL AND ENVIRONMENTAL SPECIFICATIONS	
Dimensions (W x H x D)	17.3 x 1.7 x 14.6 in (44 x 4.3 x 37 cm)
Weight	16 lbs (7.3 kg)
Temperature	−22 °F to 140 °F (−30 °C to 60 °C) operating for base unit with or without encryption module 32 °F to 122 °F (0 °C to 50 °C) operating for base unit configured with optional interface modules −40 °F to 185 °F (−40 °C to 85 °C) non-operating
Humidity	5 to 95% (non-condensing)
Heat Dissipation	163 BTU/hour (maximum)
Power Consumption	48 watts (maximum)
Voltage Operating Range	100V to 240V, 50/60Hz
AC Power Current Draw	Less than 0.50A at 120VAC, less than 0.25A at 220VAC
DC Power Operating Range	20 to 60 VDC
DC Power Current Draw	Less than 2.0A at 24VDC Less than 1.0A at 48VDC

SPECIFICATIONS	
SECURITY	
FIPS 140-2	Level 2
Common Criteria	EAL 2
SAFETY CERTIFICATIONS	
North America	UL 60950-1, CSA C22.2 No. 60950-1
EMC/EMI CERTIFICATIONS	
North America	FCC Part 15; Class A Industry Canada ICES-003; Class A
Europe EN 55022 EN 55022 EN 61000-3-2 EN 61000-3−3 EN 55024 EN 61000-4-2 EN 61000-4-3 EN 61000-4-4 EN 61000-4-5 EN 61000-4-6 EN 61000-6-11	Radiated emissions; Class A Conducted emissions; Class A Conducted emissions; Class A Flicker Immunity Esd immunity Radiated immunity EFT/B immunity Surge Conducted immunity Voltage interruption / DIPS
Australia / New Zealand	AS/NZS CISPR 22; Class B
Japan	VCCI Class B
Australia / New Zealand	AS/ACIF S003, ACA TS016, TNA1
ENVIRONMENTAL REGULATORY	
EU WEEE Directive	EN 50419 compliant
China Management Methods (CMM)	Ministry order #39

MCG 8000 Conventional Channel Gateway

The MCG 8000 provides the interface between the IP network and conventional sites in the ASTRO system by translating the voice and data into the format needed for each individual site type. The MCG 8000 supports circuit, serial and Ethernet based interfaces to conventional base stations. CCGW serves as the control point between the ASTRO core site and the remote site devices (that is, GCM 8000 Comparator, GTR 8000 Base Radio, and GPW 8000 Receiver).

The MCG 8000 supports three10/100/1000 Ethernet ports as well as a console port and a removable power supply subsystem (on the rear of the chassis).

SPECIFICATIONS		
CAPACITIES	BASE UNIT CAPACITY (MAX)	BASE UNIT CAPACITY (MAX)
Channels per MCG 8000 Chassis1	16	**32**
IP conventional (analog, MDC 1200 or digital)	16	16
Analog	N/A	8
Digital conventional	N/A	8
Mixed mode[2]	N/A	8
MDC 120	N/A	8
ACIM	N/A	8
PHYSICAL AND ENVIRONMENTAL		
Dimensions (W x H x D)	17.3 x 1.7 x 14.6 in (44 x 4.3 x 37 cm)	
Weight	7.3 kg (16 lb)	
Temperature	-22°F to 140° (-30°C to 60°C) operating -40°F to 185°F (-40°C to 85°C) non-operating	
Humidity	5% to 95% non-condensing	
Heat dissipation	134 BTU/hour (maximum)	
ELECTRICAL		
AC power operating range	100 to 230 VAC (-10%, +6%), 50/60 Hz	
AC power current draw	Less than 0.50 A at 120 VAC Less than 0.25 A at 220 VAC	
DC power operating range	24 VDC to 48 VDC (source) 20 VDC to 60 VDC maximum	
DC power operating draw	Less than 2.0 A at 24 VDC Less than 1.0 A at 48 VDC	
Power consumption	48 watts (maximum)	

DCG 9000 Dynamic Channel Gateway

The DCG 9000 is a multi-purpose network communication device designed to interconnect multiple radio sites and dispatch console configurations within ASTRO radio systems. Interconnect ASTRO systems and site equipment for advanced capabilities, or connect to third-party site equipment with the P25 Digital Fixed Station Interface (DFSI) interface and get standard P25 functionality.

Support for both digital and IP analog channels can give you the flexibility you need today with the confidence that you are protected for future expansions. Shipped with a universal power kit and a 19 inch equipment tray, the DCG 9000 is easy to install and service.

SPECIFICATIONS	
CONNECTIVITY	
Connections	Dispatch consoles Conventional sites Trunking sites IP simulcast prime site IP simulcast remote site Hub site or C-Sub Conduit hub site
Voice Calls	Digital voice call, encrypted or clear with PTT ID IP analog voice call
Dispatch Console Supported	MCC 7100 MCC 7500
RADIO CONTROL	
Dispatch Console to Subscriber	Status query Channel selection command Squelch control command Repeat on/off Radio check Radio inhibit/uninhibit Radio unit monitor Call alert
Subscriber to Dispatch Console	Call alert Status update Message update Emergency alarm
Station Control	Frequency select Repeater on/off Monitor on/off Wildcard 1 on/off Wildcard 2 on/off

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