

# FlexPath™

## Wideband Channel Bonding Technical Specifications



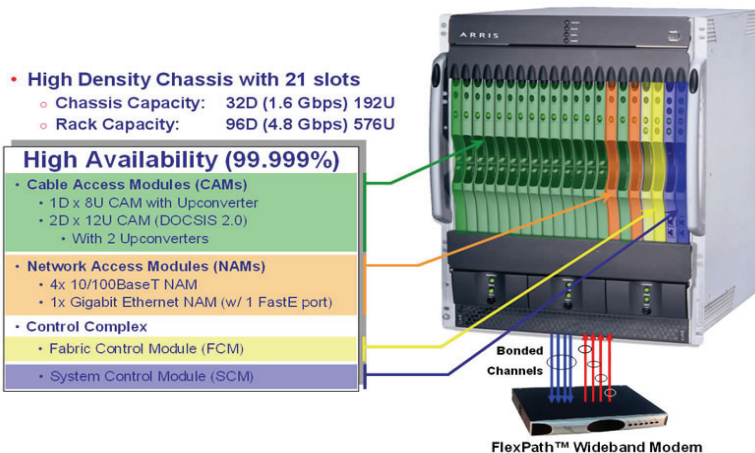
### ARRIS FlexPath Wideband Channel Bonding

The ARRIS FlexPath™ solution is a DOCSIS® 3.0-based channel bonding technology that delivers more bandwidth per subscriber than previously available. DOCSIS deployments can achieve downstream data rates of up to 160 megabits per second and upstream data rates of 120 mbps. The technology provides higher data rates by virtually bonding multiple channels together. Bonded transport speeds for Euro-DOCSIS® deployments are 195 Mbps downstream (TCP) and 120 Mbps upstream.

Up to four DOCSIS/Euro-DOCSIS 2.0 upstream channels can be aggregated to form a dedicated return path for very high data throughputs between the Cable operator and the subscribers' premises. ARRIS FlexPath technology surpasses xDSL data rates while decreasing operators' CAPEX by permitting large-scale statistical multiplexing of deployed modems and ARRIS Touchstone® Wideband Modems WBM650 with existing C4 CMTS hardware. Competing DOCSIS/Euro-DOCSIS solutions may require 24 to 32 MHz of contiguous downstream spectrum with no upstream aggregation, which limits bandwidth efficiency for true high-speed services delivery.

The following table shows nominal data rates with FlexPath Release 5.1 Software in the ARRIS C4® CMTS and Firmware Release 2.0 of the ARRIS Touchstone® Wideband Modem WBM650, based on DOCSIS 3.0 specifications:

Config. Option	* Max DOCSIS Down-stream	* Max Euro-DOCSIS Down-stream	Max US Speed 3.2 Mhz, QAM16	Max US Speed 3.2 Mhz, QAM64	Max US Speed 6.4 Mhz, QAM16	Max US Speed 6.4 Mhz, QAM64
4x4	160 Mbps	200 Mbps	40 Mbps	60 Mbps	80 Mbps	120 Mbps
4x1	160 Mbps	200 Mbps	10 Mbps	15 Mbps	20 Mbps	30 Mbps
3x3	120 Mbps	150 Mbps	30 Mbps	45 Mbps	60 Mbps	90 Mbps
2x2	80 Mbps	100 Mbps	20 Mbps	30 Mbps	40 Mbps	60 Mbps



FlexPath capabilities for the C4 CMTS are enabled with a simple software upgrade. All installed legacy DOCSIS 1.0, 1.1 and 2.0 modems can coexist on the same channels with the new Touchstone Wideband WBM650 modems.

### Investment Protection

- Reuse 100% of deployed chassis and modules

### Reduced Operational Cost

- Subscriber satisfaction and retention
- Carrier-grade reliability and performance
- Co-existence of FlexPath, DOCSIS and Euro-DOCSIS modems

### Simple Network Engineering

- Flexible placement of RF frequencies – No channel restrictions
- Co-existence of FlexPath modems with legacy DOCSIS and Euro-DOCSIS modems

### True Wideband Technology

- Four (4) DOCSIS/Euro-DOCSIS 2.0 downstream channels transport 160 Mbps speeds
- Four (4) channels in the upstream for transporting 120 Mbps speeds

### New revenue opportunities:

- New residential tiers
- Commercial services
- New IPTV alternatives

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### Cadant C4 CMTS

### WBM650 FlexPath Wideband Modem

<b>Installation Environment:</b>	RF Interfaces ..... External 'F' type connector Network Control Interface ..... Dual RJ-45 Ethernet connections WAN Interfaces: 10/100 BaseT Ethernet; Gigabit Ethernet Power ..... Dual dc voltage mains: -48 V dc (-44 to 72 V dc) Optional ac power configuration Power Consumption ..... 2800 W max at -48V dc.	RF Interface ..... External 'F' type connector LAN Interface ..... 10/100/1000 Base-T Ethernet RJ-45 Input Power ..... 115/120 VAC 60 Hz or 220/240 VAC 50 Hz
<b>RF Downstream:</b>	CAM Frequency Range (MHz) ..... 91-857 (DOCSIS 2.0); 100-860 (Euro-DOCSIS 2.0) Modulation (QAM) ..... 64 or 256 Max Data Rate per Bonded Group DOCSIS ..... 160 Mbps Euro-DOCSIS ..... 168 Mbps RF Output Level (dBmV) ..... 50-61	Frequency Range (MHz).... 88 – 860 (108-862 Euro-DOCSIS 2.0) Modulation (QAM) ..... 64 or 256 Maximum Data Rate DOCSIS (A & C Variant) ..... 160 Mbps Euro-DOCSIS (B Variant) ..... 220 Mbps RF Input Sensitivity Level (dBmV) ..... -15 to +15
<b>RF Upstream:</b>	Frequency Range (MHz) ..... 5-42 (DOCSIS 2.0) 5-65 (Euro-DOCSIS 2.0) 5-55 (Japan) Modulation ..... QPSK, 8 QAM, 16 QAM, 32 QAM, 64 QAM, 128 QAM (S-CDMA only) Max Data Rate/Channel ..... 30.72 Mbps Receive Input Level (dBmV)..... -16 to 29	Frequency Range (MHz): 5-42 (WBM650A), 5-55 (WBM650C), 5-65 (WBM650B) Modulation ..... QPSK, 8 QAM, 16 QAM, 32 QAM, 64 QAM 128 QAM (S-CDMA only) Data Rate/Channel (DOCSIS 2.0 Based) ..... up to 30 Mbps RF Output Level: A- TDMA: .. +17 to 51 dBmV (32 QAM, 64 QAM) +17 to 52 dBmV (8 QAM, 16 QAM) +17 to 55 dBmV (QPSK) RF Output Level: S-CDMA: ..... +17 to +53 dBmV(all modulations) Automatic Level Adjust ..... Yes Gain Control Range (dB) ..... 40 Frequency Accuracy (ppm)..... 50 Output Impedance (Ohms) ..... 75
<b>Physical:</b>	Operating Temperature °F / (°C) ..... 32-122 / (0 -50) Storage Temperature °F / (°C) ..... -4 to 158 / (-20 to 70) Operating Humidity (Min.-Max.) ..... 5-95% (Non condensing) Dimensions (H x W x D) inches / (cm) ..... 24.5 x 17.4 x 20.0 / (62.2 x 44.2 x 50.8) Weight (Fully Loaded) lbs. / (kg) ..... 150 (68)	Operating Temperature °F (°C) ..... 41 to 104 (5 to 40) Relative Operating Temperature: (Non-Condensing Humidity) (Min.-Max) ..... 5-85% Storage Temperature °F (°C)..... -40 to 158 (-40 to 70) Color ..... Dark gray Dimensions excluding F-connector: (H x W x D) in. (cm) ..... 1.5 x 11.5 x 8.3 (3.8 x 29.2 x 21.1) Weight lbs (kg) ..... 2.8 (1.27) Diagnostic LEDs ..... Power, DS, US, Online, Link, & System
<b>Certifications: (Regulatory/Safety/Physical)</b>	Safety: UL® 60950, CSA C22.2 No. 950, IEC60950 FCC Part 15 Class A, EN300 386-2 (CISPR 22, Class A) GR-1089-CORE (ESD, Grounding Electrical Safety) Designed to NEBS Level 3 Requirements Environmental: GR-63-CORE, ETS 300 019	Safety: UL® 60950-1, eK/MIC FCC Part 15 Class B CE, CB, VCCI, PSE RoHS, WEEE
<b>Miscellaneous:</b>	<b>Release 5.0 Software:</b> DOCSIS 2.0; Euro-DOCSIS 2.0 (A-TDMA & S-CDMA); PacketCable 1.0/1.1; DOCSIS Set-top Gateway (DSG); PacketCable Multimedia (basic) Support  <b>Protocol Support:</b> RIPv2 (RFC 1723); OSPFv2 (RFC 2328); BGP4; IS-IS; DHCP Relay Agent (Option 82); ICMP (RFC 792); ECMP (Equal Cost Multipath Load Balancing); CIDR (Classless Inter-Domain Routing) (RFC 1519); IGMPv2 and multicast flows (RFC1112); Virtual Route/Forwarding Instances (VRFs); Sub interfaces ; IEEE 802.1p priority bit mapping; 802.1Q VLAN tagging w/Optional Software Support – Licensed per C4 CMTS downstream  <b>Other features:</b> Interface Bundling across any number of RF interfaces; SNMP v1, v2c and v3 ; DOCSIS MIBs and Cadant enterprise MIBs; Dynamic Upstream and Downstream Cable Modem Load Balancing; Integrated Upstream Agility; Lawful Intercept (SII Encapsulation) PIM-SSM; Flexible Full US to DS Mapping within CAM; Telnet; SSH2 and SFTP; IP DiffServ ; Advanced CM Config File Verification; Cable Modem Proxy; Extended ACLs, IGMP ACLs & Named ACLs	<b>Environmentally Friendly ARRIS Green</b> ARRIS has introduced the Touchstone WBM650 as a RoHS (Restriction of Hazardous Substances) compliant product. Please contact your ARRIS Account Representative for more information on the European RoHS directive.



### For Ordering Information, contact your ARRIS Account Representative

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