

The G.now Gigabit BB access Solution For the Last Mile of FTTdp

Bundled Copper Cable MDU Edition(1:1 Phone Line)

Road To Carrier Can Take For Giga-World ?



Two roads diverged in a yellow wood, And sorry I could not travel both. And be on traveler,
long I stood, And looked down one as far as I could To where it bent in the undergrowth,... by Robert Fros
t



* G. now is based on a Technology of Marvell

The G.now™ Access Solution For The Last Mile

Bundled copper cable MDU edition (1:1 Phone Line)

The G.now™ Access Solution

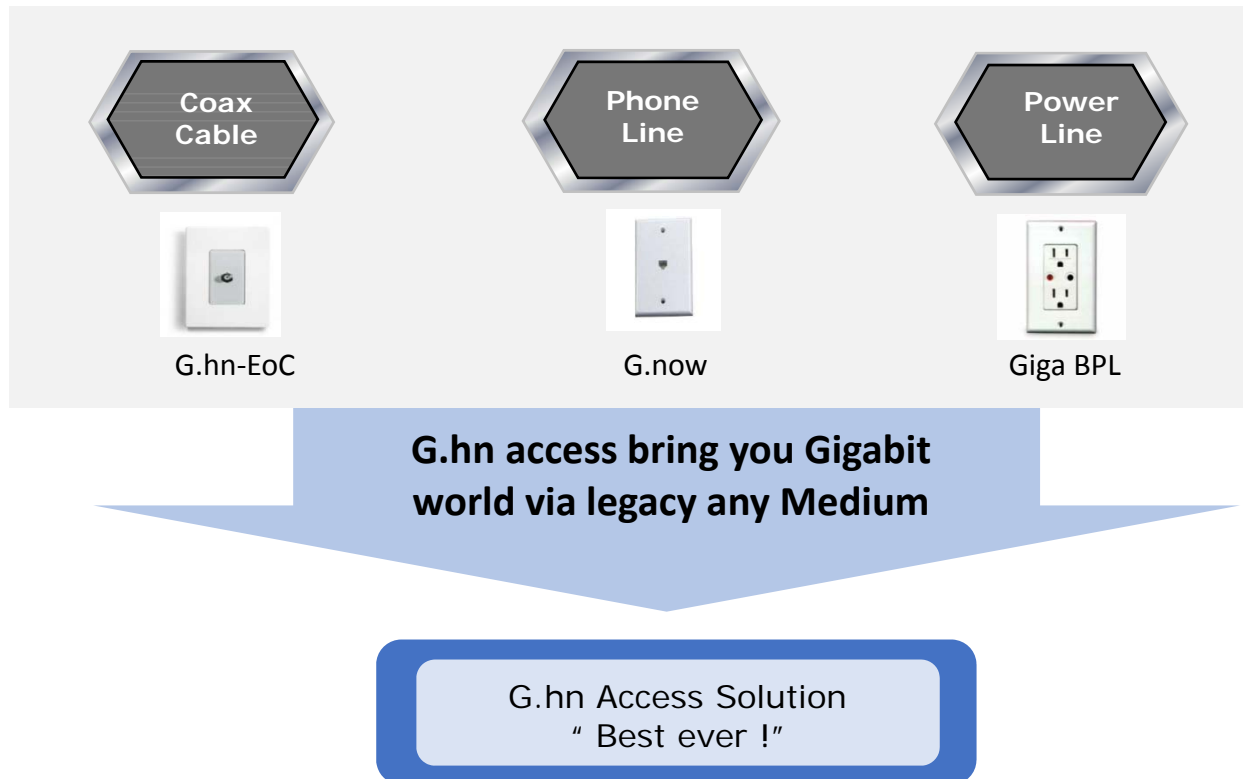
The G.now™ Access Solution is an extension of G.hn networking technology for broadband access and enlarges the scope of the ITU-T G.hn to meet the market requirements. The G.now™ is G.hn technology applied for wire-line broadband access networks, as an upgrade to VDSL2. Enabling unmatched connectivity at up to 1 Gbit/s PHY rate over existing copper wiring and a much higher data rate (over 500 Mbps) than legacy VDSL systems (only 100 Mbps). The G.now™ is poised to take on the leadership of the broadband access services for the last mile. The G.now™ technology can quickly enable many homes and consumers around the world to enjoy seamless delivery of high quality live content from the cloud at any time for their everyday smart-life and smart-lifestyle. The G.now™ is based on TDD architecture (Time Division Duplexing) and an increased spectrum of up to 100 MHz OFDM. The G.now™ is able to lead the pack in delivering high performance and most reliable and secure end-to-end solution for the 'Smart-Life and Smart Lifestyle.

The G.now™ is the brand name of Marvell, a worldwide leader in integrated silicon solutions. The Marvell G.now™ technology is Marvell's award-winning home-grid forum-certified family of G.hn chipsets to provide FTTH class gigabit broadband access to multi-dwelling unit (MDU) buildings over existing phone wiring.

It is our passion to closely collaborate with global operators, service providers, internet companies, OEMs, ODMs and other ecosystem partners to bring the benefits of the G.now™ technology to the masses of consumers around the world for better lives.

What is G.hn?

G.hn is the common name for a [home network](#) technology family of standards developed under the [International Telecommunication Union](#)'s Telecommunication Standardization sector (the [ITU-T](#)) and promoted by the HomeGrid Forum and several other organizations. The G.hn specifications define networking over power lines, phone lines and coaxial cables with data rates up to 1 Gbit/s. Further information about G.hn please click <http://www.homegridforum.org> or visit our website www.bcl-com.com



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The G.now™ Network System

The G.now™ is a Gigabit internet solution which is adapted G.hn technology that enables data rates up to 1 Gbit/s over legacy bundle copper cable(bundle phone line) existing infrastructure and addresses Gigabit speed internet associated with FTTH(Fiber to the home) applications. It is last mile solution for the G.hn-Based FTTH (Fiber To The Home) Solution and has an impressive performance.

G.now™ Technical Benefit

The G.now™ increases available spectrum on the wire
The G.now™ provides flexible bandwidth allocation
The G.now™ based on state-art-of-state G.hn PHY/MAC protocol

G.now™ Business Benefit

Increases data rates to “Gigabit-level” using existing phone line
Flexible bandwidth allocation ensures flexible service offering
Significantly lower installation & equipment costs than pure FTTH

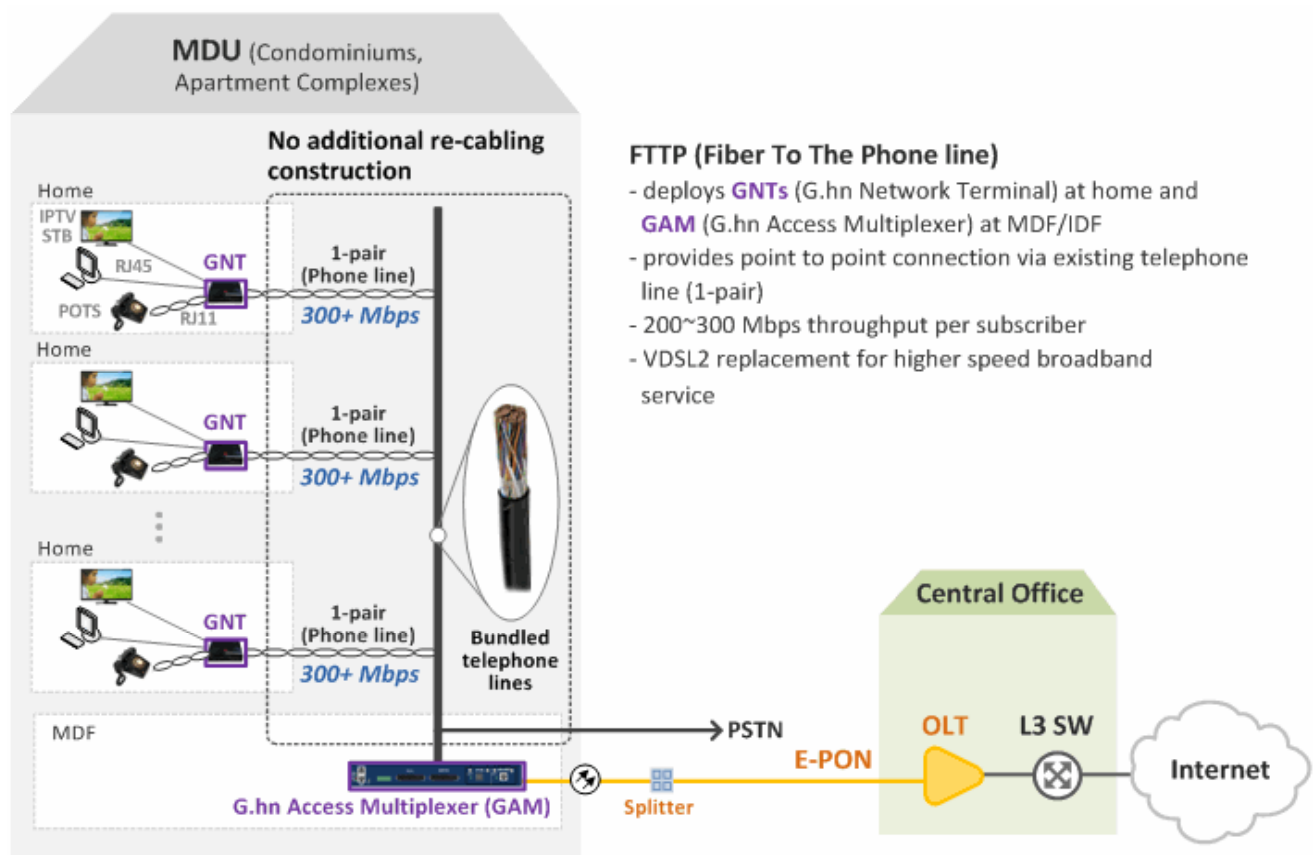
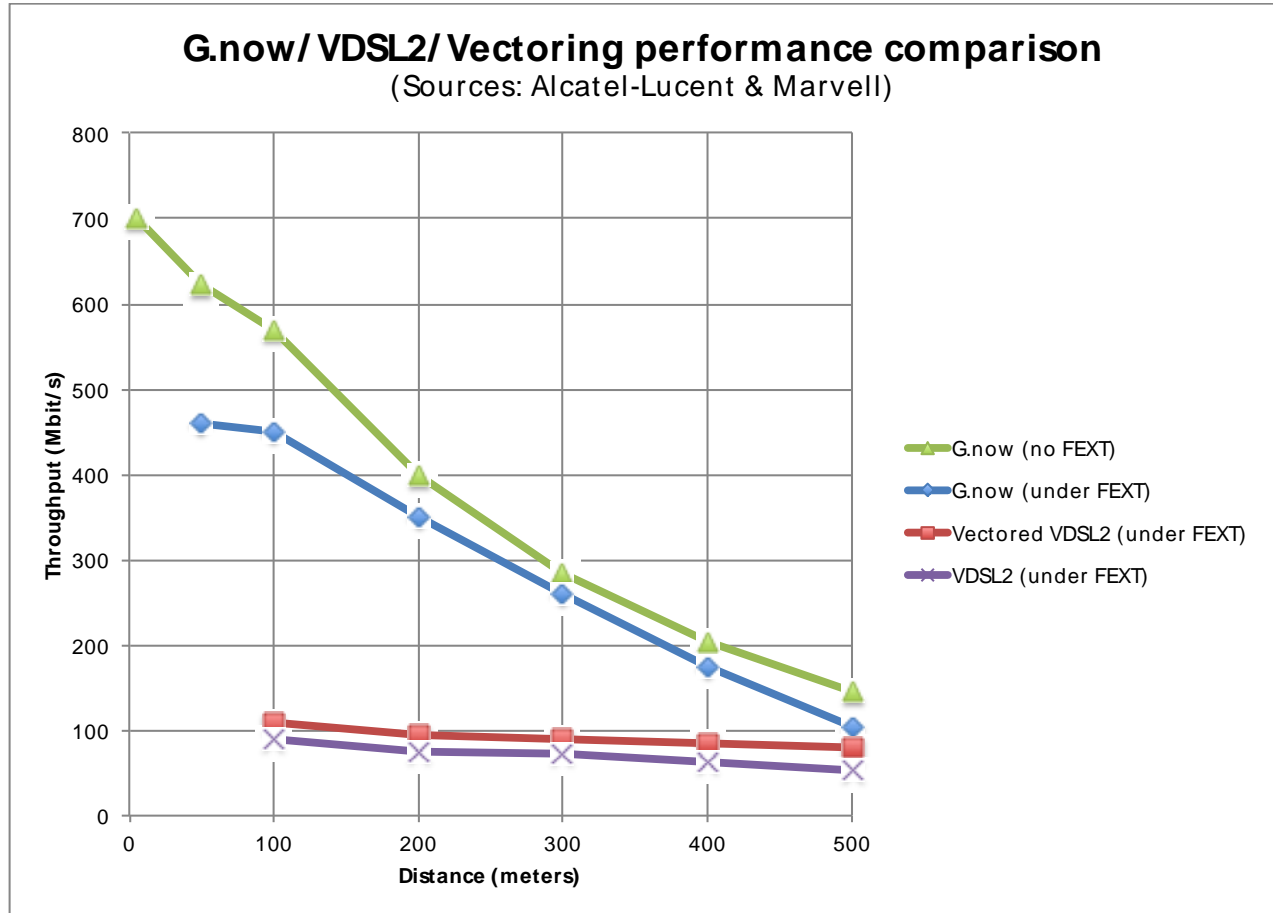


Fig 1. Typical G.now network diagram

Comparison with legacy DSL technologies



Items	100M VDSL2	G.now
Standard	ITU-T G.993.2	ITU-T G.9960, G.9961
Main Application	Access network solution	Mainly for Home networking and additionally for Access network solution
Rate	Max 100Mbps (bi-dir)	Max 500Mbps (uni-dir) Max 250Mbps (bi-dir)
Modulation	DMT	OFDM
Freq. Used	> 30MHz	> 100MHz
Error Correction	FEC	LDPC FEC
Max power	20.5dbm	16dbm

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LGW-COT12P(GAM)

LGW-COT12P (GAM: G.hn Aggregated Multiplexer) a product line-up which is based on ITU-T G.hn G.9960/G.9961 technology that enables data rates up to 500Mbps over bundle copper cable (bundle phone line) and addresses Gigabit speed internet associated with FTTH(Fiber to the home) applications. Investment of FTTH is expensive for deployment with SoC, SFP module, labor, scattered population, problems with fiber wiring to the home, and slow roll-outs.

LGW-COT12P G.hn-Based FTDP (Fiber to the distribution point) solution has an impressive performance, is easier to deploy and provides substantial CAPEX savings compared to traditional FTTH.

LGW-COT12P Series products enable Carriers to deliver FTTH-class service to MDU apartments while avoiding the costs of replacing copper wires with fiber and truck-roll. These Gigabit speed data rates ensure the access network is future-proof and ready to provide high quality services such as multi-stream FHD/UHD IPTV, cloud-based storage or 802.11ac wireless hotspots.

The crosstalk in non-shielded bundle cable is solved by the Marvell Crosstalk mitigation feature, which guarantees 3-5 times higher speed(200~500Mbps) than VDSL2 with same environment.

Feature

- ITU-T G.9960 and G.9961 compliant
- 12Port G.hn Interface, 12Port PHONE Interface
- 1G SFP optical modules
- 2 different uplink modules supported
- BCM56143 inclusive
- 88LX3142, G.hn Digital Processor inclusive
- Max. 700Mbps IP throughput
- Dynamic PSD, Power Mask Notching
- Priority Parameter based QoS
- IPv6 supported
- Provides 5-10 times speed than legacy VDSL :
 - increased spectrum(up to 100MHZ)
 - TDD with configurable unlinK/downlink ratio
 - NDIM technology for interference mitigation
- Advanced energy-saving technology



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LGW-COT12P(GAM) Specification

Hardware	
System Architecture & Console	2 x Uplink module slots 1G SFP Combo 12 port PSTN 12 port RJ45 Console RJ45, RS232C(Baud Rate 9600)
Main Chipset	CPU Chipset : P2010NSN2HFC, Communications Processor with Network Acceleration Hardware Switching Chipset : BCM56143 , 24port 1 GB with 2x10GB Switch G.hn Chipset : 88LX3142, G.hn digital Processor
Memory	1GB, DDR3 SDRAM
Physical Dimension	19" Rack Mount type, 1U 350(D) x 410(w) x 45mm(H)
Switching Fabric	88Gbps
Management	Syslog, SNMPv2, RMON, SSH, TFTP, FTP Security by using password for log-in via Console and Telnet NTP, Port mirroring, TCP DUMP
FAN	3ea FAN Module, Max. 7,500rpm
LED	Power, System Active, Management, G.hn Link
Environment Conditions	
Input power & frequency	220V AC and 100MHz
Power Consumption	Max 80W
Operating temperature/ humidity	-10 °C ~ 60 °C / 0 ~ 90% non-condensing
Storage temperature	-20 °C ~ 70 °C
G.hn Standard and Certification	
Modulation	OFDM(Orthogonal Frequency Division Multiplexing)
G.hn Framing	IUT-T Standard-based G.hn G.9960/61
IPv6	Enabled
Standard/ Certifications	ITU-T G.9960 Support(G.hn PHY) ITU-T G.9961 Support(G.hn MAC) ITU-T G.9962 Support(Management Plane) ITU-T G.9954 Support(Phoneline networking transceivers) ITU-T G.9980 (TR-069 Remote management IEEE 802.3z for 1000Base-X IEEE 802.3x for Flow control IEEE 802.1p for CoS (Class of Service) IEEE 802.1Q for VLAN Tagging Certifications: Complies with UL, CE, CUL, FCC Part 15 Class B, EMC 89/336/EEC, ICES-003



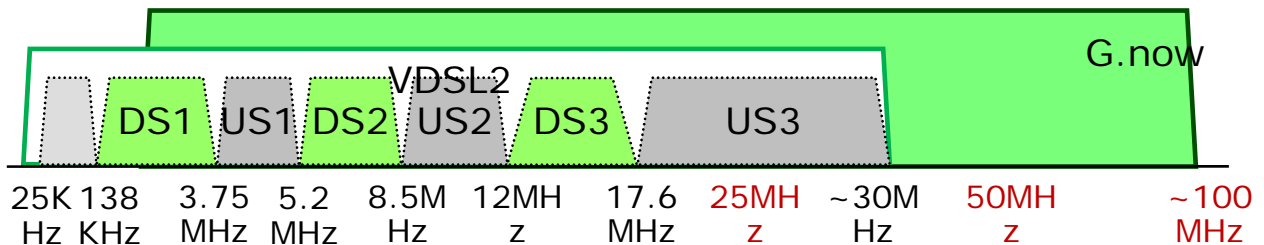
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LGW-COT12P(GAM) Software	
Mac Address numbers	16K
VLAN Number	256 VLAN
Layer 2	802.1W STP, RSTP, PVSTP 802.1D Spanning Tree Protocol 802.1Q VLAN(256) and VLAN Trunking 802.3ad Link Aggregation(MAX 32 Groups & 8members for each group) Jumbo Frame up to 9K
Management	Syslog, SNMPv2, RMON, TFTP FTP, NTP, TCP DUMP, Port Mirroring Security by using password for log-in via Console and Telnet Web Management Interface
Remote Reset	Remote H/W Reset Dying Gasp Remote reset through optical line Watch dog
Multicast	IGMPv1/V2/V3 IGMP Snooping IGMP Snooping Proxy Reporting Multicast Group up to 512 Multicast Traffic Block / Filtering Protection of malicious multicast traffic from subscriber port
DHCP	DHCP Relay DHCP Sever DHCP message Filtering DHCP Request Flooding protection(DHCP Snooping rate-limiting) DHCP Option 82
Security	DLF, Broadcast, TCP-SYN, IGMP Attack protection DHCP Filtering, Mac Filtering, NetBEUI, NetBIOS Filtering, NBT Packet filtering based on IP address and TCP, UDP port Packet control to well-known port no MAC Spoofing, flooding protection(static MAC, MAC count) Multicast/Broadcast flooding protection Service classifying for the Control Packet(Ping, Telnet, SNMP, FTP, TFTP etc.) 8 CPU queue, Rate-limit to CPU traffic
QoS / ACL	Layer 2(Source/Destination MAC Address, VLAN ID, COS Field) Layer 3(Source/Destination IP Address, DSCP Field) Priority/Parameter based QoS 8 queue per port SPQ, WRR, SPQ + SDWRR Egress Rate-shaping : port , queue DSCP marking/remarking Ingress ACL : 128



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LGW-RT4P/1P(GNT : G.hn Node Terminal)

LTI LGW-RTxP is a product line-up which is based on ITU-T G.hn G.9960/G.9961 technology. It is ITU-T G.hn networking standard compliant Ethernet Terminal for any copper wire medium. LGW -RTxP is a LTI LGW-COTxP slave modem utilized over Phone line and gigabit speed data service. LGW-RTxP provide one or four GE port for IP device aggregation in Home

Specification

LGW-RT4P(1P) Specification	
System Architecture	G.hn Modem G.hn Line 1PORT(RJ45 connector), GE LAN 1 / 4 PORT(RJ45 connector)
Memory	64MB, DDR2 SDRAM
Physical Dimension	145 X 100 x 28mm / 91 X 59 X 28mm (W x D x H)
Max. Transfer Rate	Up to 500Mbps
Modulation	OFDM(Orthogonal Frequency Division Multiplexing)
Management	HTTP Web-based; Firmware upgrade via TFTP
Networking Protocols	802.1D Ethernet Bridge, 802.1Q VLAN, QoS, IGMP Snooping
Environment Conditions	
Power Consumption	Max. 3.5W
Operating Temperature/Humidity	0 °C ~ 50 °C / 10 ~ 90%
EMC	EMI Class B
Media Interface	
Interface Type	RJ45, 1Port G.hn Interface RJ45, 1 Port Phone Interface RJ45, 1 Port / 4 Port Ethernet Interface
Power Switch / Input	On/Off Switch / DC12/1A
Surge	2KV
G.hn Specification	
Standard/Certification	ITU-T G.9960 Support(G.hn PHY) ITU-T G.9961 Support(G.hn MAC) ITU-T G.9962 Support(Management Plane) ITU-T G.9954 Support(Phoneline networking transceivers) ITU-T G.9980 (TR-069 Remote management) IEEE 802.3z for 1000Base-X IEEE 802.3x for Flow control IEEE 802.1p for CoS (Class of Service) IEEE 802.1Q for VLAN Tagging Certifications: Complies with UL, CE, CUL, FCC Part 15 Class B, EMC 89/336/EEC, IC ES-003



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Thank you for your time and your consideration!

Sincerely,
Your BCL Team

Marketing/Sales & Distribution



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