

Introducing PATH1's Products

IP Video Gateway Cx1000, Ax100

ASI/SDI Carrier-Class Fast/Gigabit Ethernet IP Video Gateway

Cx1000 : SDI or ASI

Ax100 : ASI (Tx, Rx, BD)

Chameleon vidX™ Cx1800 Series

PX1801 or PX1810 : Pass-through Gateway

DX1801 : ASI/GbE IP Video Demultiplexer Gateway

MX1810 : GbE/ASI IP Video Multiplexer Gateway

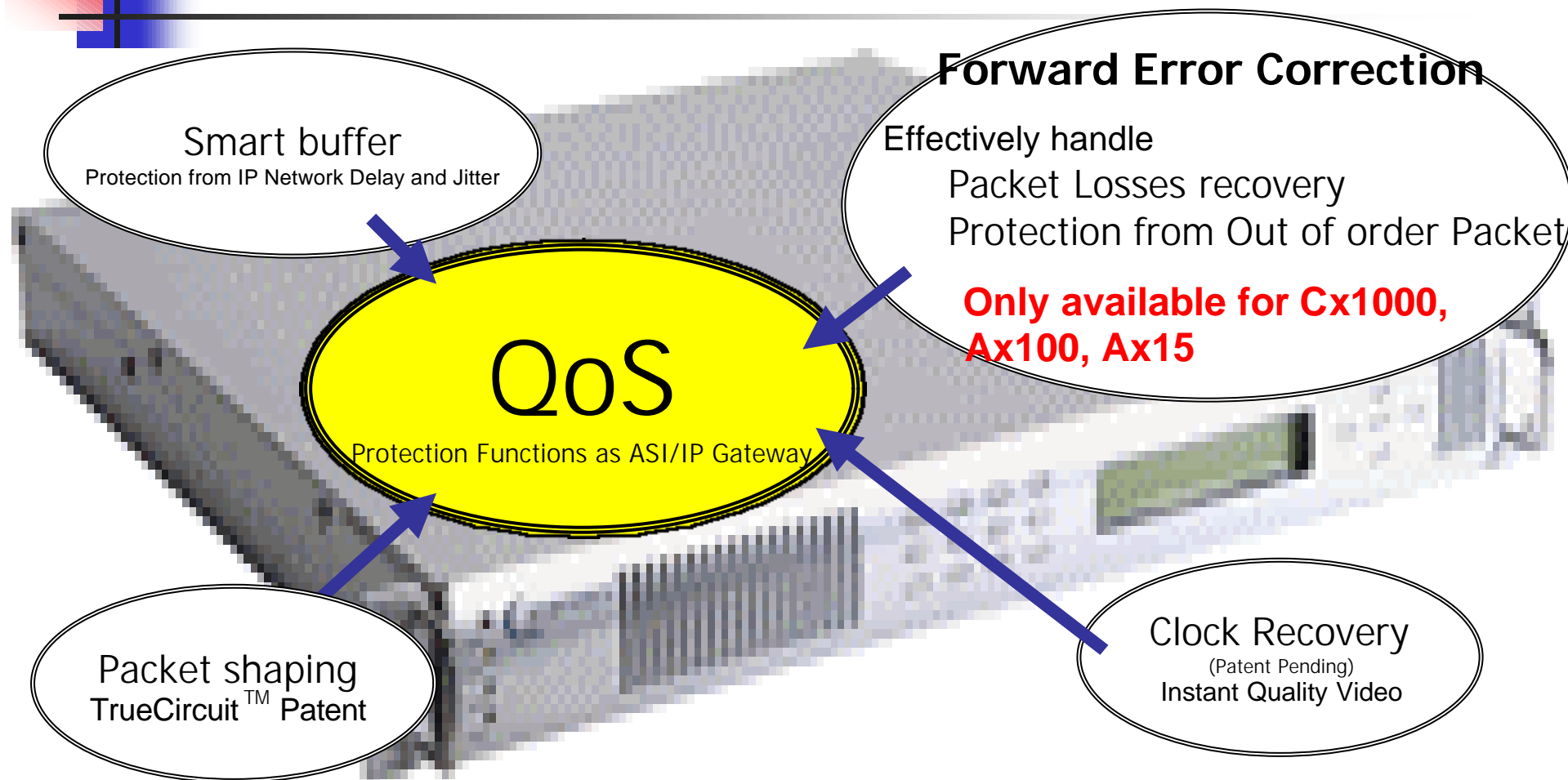


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IP Video Gateway/Chameleon vidX™ Series Video over IP QoS Control Technology



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Features of IP Video Gateway/Cameleon vidX™ Series

PATH1's Products			
Product Name	IP Video Gateway	Chameleon vidX MUX/DEMUX	
Model	Cx1000, Ax100	DX1801	MX1810
Special Features	*QoS Protected broadcast-quality video over existing IP networks *Protections from Packet Losses and out-of-order Packets using FEC *DVB-ASI(MPEG-2 TS) and SDI(CCIR-601) (Ax100 is DVB-ASI only) *Uncompressed SDI(D1) over IP in sub frame latency for Cx1000 only	*Demultiplexer, 8 port ASI to IP(GbE) *Delivers broadcast-quality, SD and HD, VoD streams over IP-enabled HFC networks *Support IP-based Quality-of-Service(IP Precedence and DiffServ) *Automatic MPEG-2 program translation	*Multiplexer, IP(GbE) to 8 port ASI *Delivers broadcast-quality, SD and HD, VoD streams over IP-enabled HFC networks *Support IP-based Quality-of-Service(IP Precedence and DiffServ) *Automatic MPEG-2 program translation
IP Output Rate(Max.)	SDI (D1), SDTI, DVB-ASI:(Ax100 is DVB-ASI only) 270Mbps (1000BaseSx 600Mbps using double FEC mode) 80Mbps (for 100BaseTX) DVB-ASI	952Mbps	952Mbps
Input	1 port DVB-ASI, 1000BaseSX, 100BaseTX	Up to 8 DVB-ASI input port(213Mbps each)	2 port of 1000BaseSX, LX, LH, TX (SFP optical or RJ-45 copper)
Output	1 port DVB-ASI, 1000BaseSX, 100BaseTX	2 port of 1000BaseSX, LX, LH, TX (SFP optical or RJ-45 copper)	Up to 8 DVB-ASI input port(213Mbps each)



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Impact to Market

- **Broadcaster**
 - QoS protected Uncompressed SDI over IP in sub frame latency
 - Delivers broadcast-quality DVB-ASI(MPEG-2 TS) and SDI(CCIR-601)
 - Lowers the cost of video transmission than ATM/SONET/SDH

- **CATV**
 - Delivers broadcast-quality, SD and HD, VoD stream over IP-enabled HFC networks
 - MPEG-2 TS:Plug-and-Play in cable head-end/hub environment
 - GbE and 10/100:Works with current and legacy Ethernet equipment

- **VDSL, FTTH included VOD**
 - Delivers broadcast-quality, SD and HD, VoD stream over IP-enabled FTTH or VDSL
 - Multiplexing and/or Demultiplexing MPEG-2 TS

- **Distance Learning, Video Telemedicine, Video Conference**
 - QoS protected broadcast-quality bi-directional communications with low latency



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Ax100(ASI), Cx1000 (SDI or ASI)

- 1RU (438mmW x445mmD, 2.27kg, 90-240 VAC/0.5A)
- Broadcast-quality : DVB-ASI (SMPTE 259M:MPEG-2 (4:2:0, 4:2:2) TS (Single or Multi Program)), * Uncompressed SDI (SDI (CCIR-601)/270Mbps)
- Video Interface : 1 Input and 1 Output (DVB-ASI or *SDI)/BNC
- Network interface : IP De-jitter buffer / 0 - 250 ms (supported DiffServe)
 - 10/100 Base TX Ethernet port(RJ-45) * 1port
 - 1000 Base SX Ethernet port(SC) * 1port
- Multicast : IGMP ver. 2 protocol
- Clock recovery : fast and adaptive clock acquisition and synchronization
 - Smart buffer provides strong protection against network delay & jitter
- Forward Error Correction(FEC) : Protections against packet loss & out-of-order
- Remote management : SNMP, Telnet, HTTP
- Maintenance port : RS-232
- Environmental : 0 - 50

*SDI is only for Cx1000.

Ax100 is applicable to upgrading to Cx1000 by adding Software.



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Implemented Examples of Cx1000

	item	Bandwidth	FEC	Packet Loss	Packet Re-order	IP Network Jitter	Remarks
Best effort	RTVI 5 Mbps DVB-ASI Service	7.8 Mbps Used of 8Mbps Avail.	40% FEC	~ 1k per hour Lost IP Packets	~ 10k /hr IP Packet Re- oder	~ 25mS jitter	UUNET/MCI Live:Moscow-NYC Router:Cisco3550
	C-Span 10 Mbps DVB-ASI Service	12 Mbps Used of 100 Mbps Avail.	13% FEC	~ 1sync loss per hour	~ 100 Unrecoverable IP Packets per hour	~ 50mS jitter	2-way live
Rate Guaranteed	PBS 19.4 Mbps DVB-ASI Service	24 Mbps Used of 100 Mbps Avail.	10% FEC	0 Lost IP Packets	0 IP packet Re- oder	Very low jitter	HD, iGrid, e-Cinema - Internet 2.
	Level (3) 270 Mbps SDI/ASI Service	315 Mbps Used of 1 Gbps Avail.	5% FEC	0 Lost IP Packets	0 IP packet Re- oder	<1mS jitter	From Coast to Coast USA Full time service Latency: around 35ms PCR jitter(12hops):<37ns Router:Cisco6509



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Data of Latency for Cx1000

- | | |
|--|--|
| 1. IP encapsulation time of Cx1000 | :5ms |
| 2. IP FEC encoding time of Cx1000 | :0-900ms (ex; 60ms at 20%FEC, 32burst packets)
(FEC: 6 - 50%/Pre-setting by user) |
| 3. Transportating time of 1000km using optical fiber | :4ms |
| 4. Switching or routing time/hop
(MPLS supported Juniper Cisco, and/or GSR) | :1ms |
| 5. IP FEC decoding time of Cx1000 | :0-900ms (ex; 60ms at 20%FEC, 32burst packets)
(FEC: 6 - 50%/Automatic setting by Tx) |
| 6. IP de-encapsulation time of Cx1000 | :5ms |
| 7. Network de-jitter
(Pre-setting buffer size by user) | :0-250ms (ex; 150ms) |

For DVB-ASI, added 360ms for encoding and decoding video TS
(ex. Tiernan, Low Latency Mode)

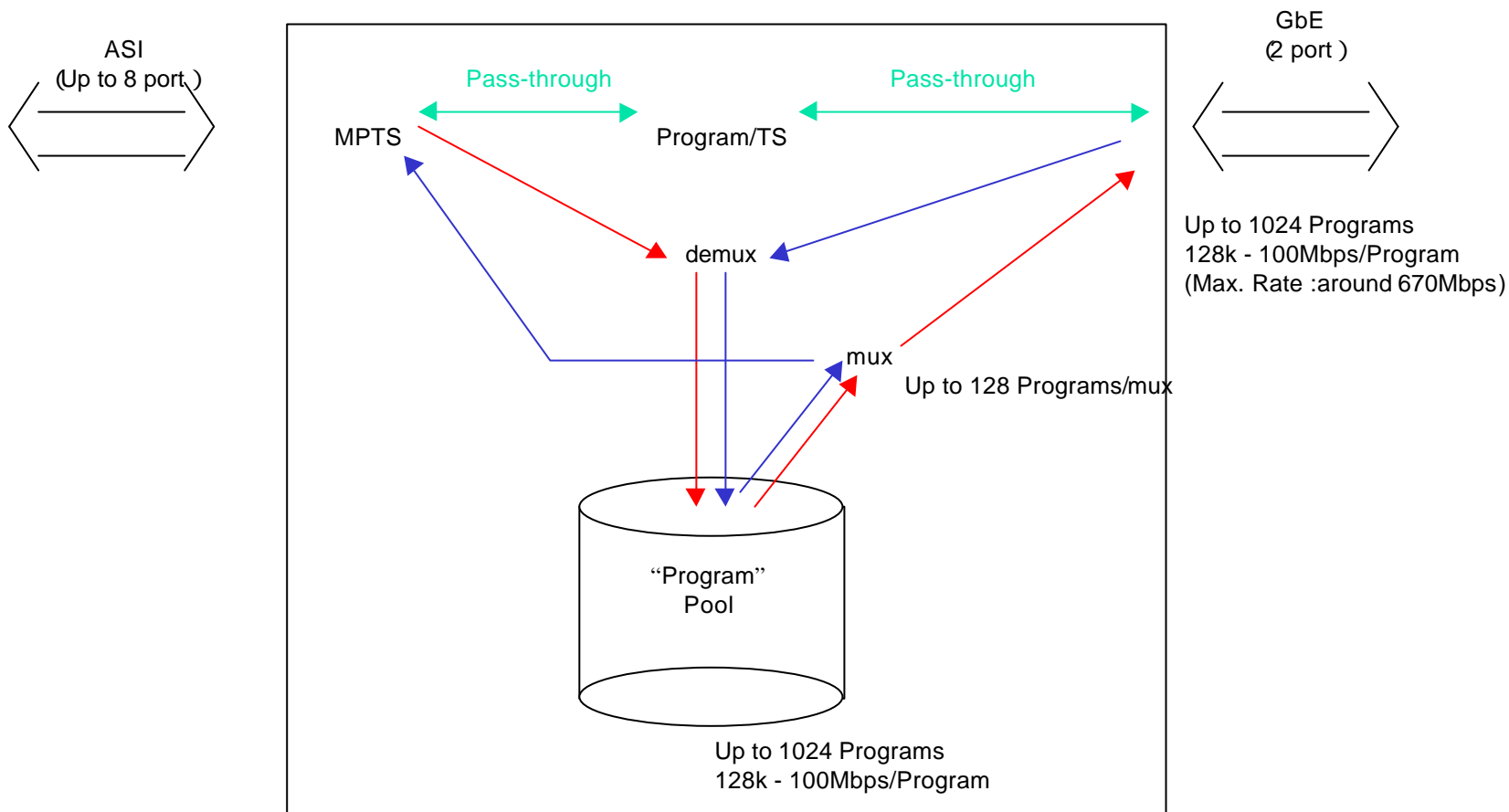


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Concept of Chameleon vidX™ Mux/Demux (vidX : video eXchange technology)

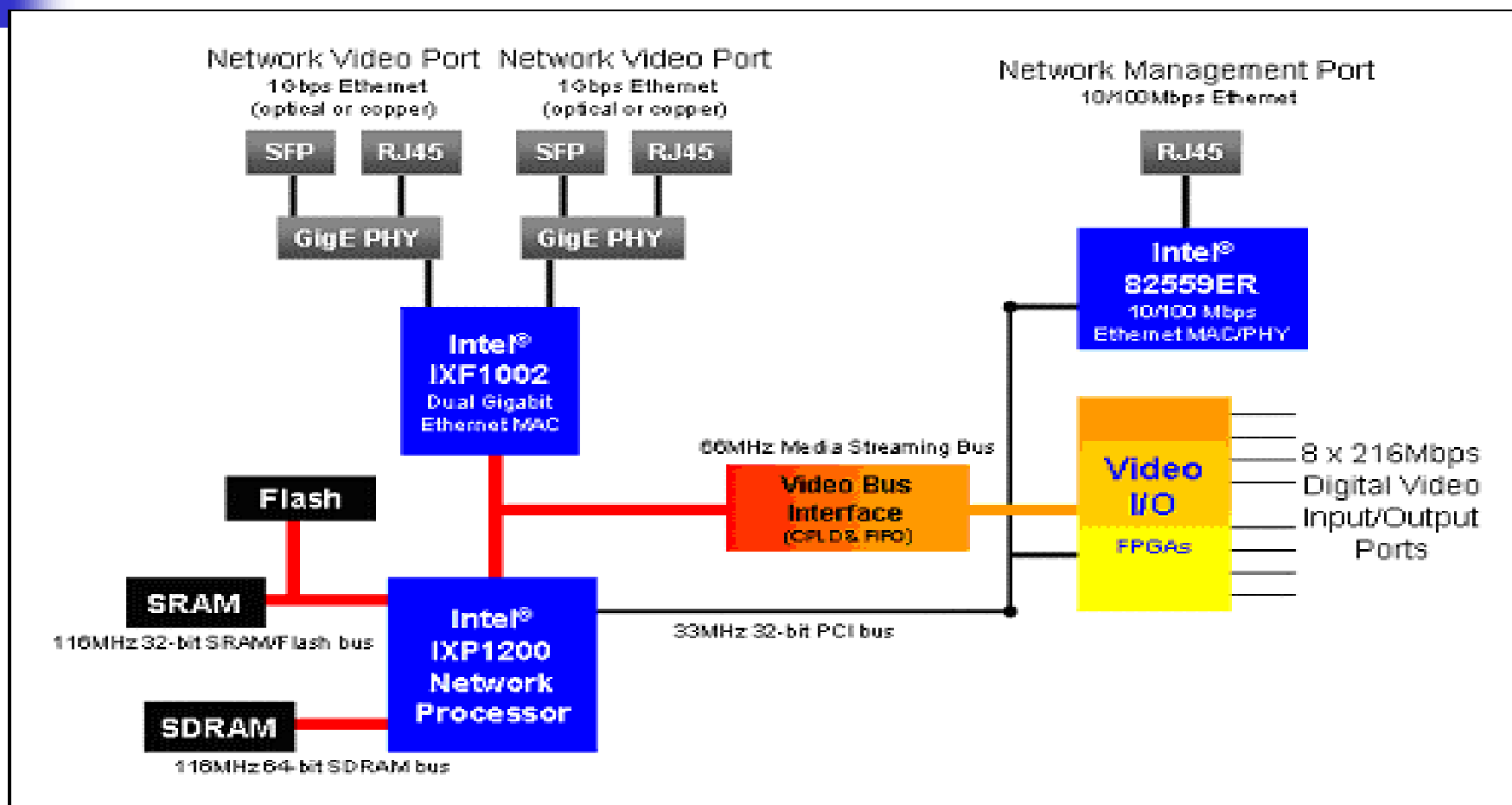


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Block diagram of Chameleon vidX™



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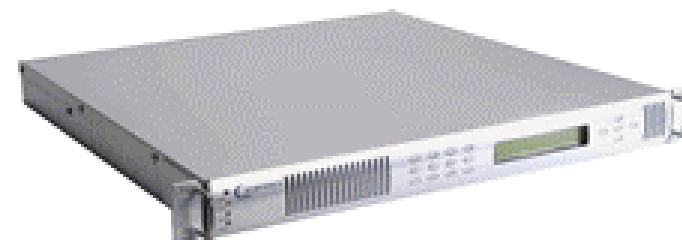
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Chameleon vidX™ DX1801

DVB-ASI to IP Video Demultiplexer Gateway

- **1RU** (438mmWidth x445mmDepth, 2.27kg, 90-240 VAC/0.5A)
- **Video Input** Total Maximum Rate of MPEG-2 TS : 952Mbps
Up to 8 port (2/4/5/6/7/8) DVB-ASI (BNC), supported 213Mbps each(Up to 100Mbps/TS)
Demultiplexer : Up to 1024 SPTS/MPTS
- **Network interface** 2 port of 1000 Base SX/LX/LH/TX Ethernet port(SFP optical or RJ-45 copper)
IP Capsulation up to 1024 MPEG-2 SPTS
Direct IP Capsulation of MPTS(without Demultiplexer)
Supported RTP/UDP/IP、UDP/IP
Outbound Management port of 10/100 Base TX Ethernet port(RJ-45)
- **Clock recovery** PCR Re-stamping & Null paket stuffing to support MPTS de-multiplexing of MPTSs to CBR-SPTSs
- **MPEG-2 program translation** Automatic & manual mapping of MPEG-2 program numbers to unicast and multicast IP Address/UDP port number
Automatic regeneration of MPEG-2 tables for the output IP-encapsulated MPEG-2 SPTS
- **Remote management** SNMP and HTTP
- **Maintenance port** : RS-232
- **Environment** : 0 - 50
- **Future-proof your network edge device,**
Network Processor Engine design for easy software upgrade
to port number and/or Multiplexer.



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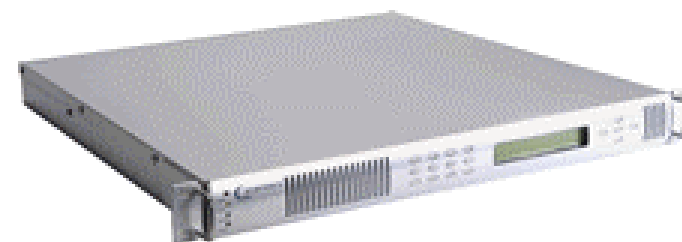
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Chameleon vidX™ MX1810

IP to DVB-ASI Video Multiplexer Gateway

- **1RU** (438mmWidth x445mmDepth, 2.27kg, 90-240 VAC/0.5A)
- **Video Output** Total Maximum Rate of MPEG-2 TS : 952Mbps
Up to 8 port (2/4/5/6/7/8) DVB-ASI (BNC), supported 213Mbps each(Up to 100Mbps/TS)
Multiplexer : Up to 1024 SPTS/MPTS
- **Network interface** 2 port of 1000 Base SX/LX/LH/TX Ethernet port(SFP optical or RJ-45 copper)
IP De-capsulation up to 1024 MPEG-2 SPTS
Direct IP Capsulation of MPTS(without Multiplexer)
Supported RTP/UDP/IP、UDP/IP
Supported Multicast (IGMP ver.2)
Outbound Management port of 10/100 Base TX Ethernet port(RJ-45)
- **Clock recovery :** Fast and adaptive clock acquisition and synchronization (Patent-pending)
Smart Buffer provides strong protection against network delay and jitter up to 250ms
PCR re-stamping to support multiplexing of MPEG-2 MPTS streams
- **MPEG-2 program translation** Automatic & manual mapping of UDP port numbers to MPEG-2 program numbers and PIDs
Automatic regeneration of MPEG-2 tables for output MPEG-2 MPTS streams
Supports PID filtering
- **Remote management :** SNMP, HTTP
- **Maintenance port :** RS-232
- **Environment :** 0 - 50
- **Future-proof your network edge device,**

Network Processor Engine design for easy software upgrade to port number and/or Demultiplexer



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Path 1 Long Haul Family

Path 1 Long Haul Products					
Legend: x - available o - optional	Cx1000	vidXwan	Ax100		
	Cx Family	Chameleon Family	Cx Family		
	Cx1000	Chameleon vidX 1811-BD	Ax100-TX	Ax100-RX	Ax100-BD
Number of ASI Ports					
1	x		x	x	x
8		x			
Number of SDI Ports					
1	x				
Encapsulation					
Path 1	x		x	x	x
Pro-MPEG		x			
Forward Error Correction (FEC)					
Path 1 - Variable	x		x	x	x
Pro-MPEG - Variable		x			
Input Format					
ASI	x	x	x		x
SDI	x				
IP	x	x		x	x
Output Format					
ASI	x	x		x	x
SDI	x				
IP	x	x	x		x
Network Interface					
FastE (10/100)	x		x	x	x
GbE (1000)	x	x	x	x	x

*vidX wan is available at September, 2004 or later



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