**Features**

- 6U height, ETSI shelf
- STM16, STM-4 or STM-1 for the Aggregate Line
- TM, ADM, and XC
- SNCP/UPSR Ring protection
- MESH SNCP
- MSP(1+1) protection for Bus or Point-to-Point
- Full Cross-Connect at VC12/VC11/VC3/VC4 levels
- 4 Tributary groups with 8 slots for General-Purpose Tributary cards
- Hot-Swappable Redundant Power cards DC or AC
- Hot-Swappable Aggregate Line and Tributary cards

**Aggregate infrastructures:**

- 2 x STM-1/4/16 SNCP ring,
- 2 x STM-1/4/16 MSP (1+1) bus, or
- 1 x STM-1/4/16 SNP with MSP (1+1) 4 fibers ring

**Tributary interface: up to**

- 252 x E1/T1 protected (1+1) or 504 unprotected
- 12 x DS3/E3 protected (1+1)
- 64 x 10/100M Ethernet
- 8 Gigabits Ethernet
- 8 x STM1 with MSP (1+1) or
- 8 x STM1 SNCP Ring
- 4 x STM4 with MSP (1+1) or
- 2 x STM4 SNCP Ring
Or a combination of all

The modular SDH-ADM node HX9416R support 2 STM16 per card CC16 and 4 STM16 payload per chassis with 2 CC16 card. The selection of the STM1-4-16 is operated by software selection and SFP module exchange.

**Other**

- External/Internal/Line timing source
- DMTF Engineering Order-Wire using VoIP phone
- Full Front Access
- TMN management (CXR-INMS) with full FCAPS and end-to-end circuit management
- Supports Ethernet over SDH:
  - GFP, VCAT w or w/o LCAS or
  - BCP-PPP PPPoS Layer 2 RFC2615

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**SDH STM16/4/1 INFRASTRUCTURE**

**HX9416R**

**SDH STM1/STM4/STM16**

**ADM/TM CONCENTRATION NODE**

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**Gigabit Ethernet and PDH distribution**

The HX9416R is the last largest configuration of HX9400R series of the ADM/TM SDH multiplexer range from CXR. This configuration with two CC16 CPU and aggregate provide a traffic’s concentration over the two 2 STM16 (2,488 Gbps) SNCP rings up to 8 STM1 or 2 STM4 sub-rings in a single node and the full cross-connect of all VC12, VC3 and VC4.

This new generation equipment, based on SDH+ technology, is design to have full non blocking add & drop up capabilities from the following tributaries:

- 252 x E1/T1 protected (1+1) or 504 unprotected
- 12 x DS3/E3 protected (1+1)
- 64 x 10/100M Ethernet
- 8 Gigabits Ethernet
- 8 x STM1 with MSP (1+1) or
- 8 x STM1 SNCP Ring
- 4 x STM4 with MSP (1+1) or
- 2 x STM4 SNCP Ring
Or a combination of all

The system support the following aggregate interfaces and Network topologies:

- 2 STM16/4/1 rings with SNCP protection
- 2 STM16/4/1 linear with MSP(1+1) protection,
- Or a combination of both

The HX9416R with a full cross-connect VC4, VC3 and VC12/VC11 has the power of a high density concentration node for TDM links and Ethernet or Gigabit Ethernet flows. SDH bus or ring infrastructures are supporting with high level of QoS all Ethernet infrastructure.
The **HX9416R** is an ETSI shelf 19” 6U fully modular. This equipment and all cards is compliant with relevant ITU recommendations, the ETSI standard, all European regulation CE, EMC and RoHS.

The security of operation is guaranteed by the redundancy of AC or DC power supply with load sharing, the redundancy of the CPU and all aggregate or tributary fiber optic interfaces are protected in MSP (1+1) or SNCP Ring or MESH SNCP modes. Every cards is hot-swappable and doesn’t affect the running services.

The **HX9416R** is a chassis **HX9400R** with two card CPU/Cross-connect **HX9400R-CC16** has a non blocking cross-connect capability of VC4 in any STM1/STM4/STM16, VC12 in V4 or VC3 in VC4. The cross connect capability is 5 x 16= 80 VC4 or 5 x 16 x 63= 5040V C12. This gives to this equipment a large capacity as an SDH central node or hub.

The **HX9400R**, like all devices of the HX9100 and HX9400 ranges, are based on the SDH-Plus feature. They are supporting GFP, VCAT and LCAS protocols. These are optimizing the transport of IP over SDH infrastructure. These features give to this range of equipment a real capability to transport the Ethernet flow with a high level security and a permanent QoS.

The system can bound in a GFP trunk n x VC12 or n x VC3 and could reserve VCxx for variable bandwidth on demand.

### HX9416-R

The **HX9416R** provides powerful Operation, Administration, Maintenance and Provisioning (OAM&P) functionality. This includes fault management, performance monitoring, configuration management, and network security management. Logs and reports can be printed as well as viewed directly.

The SFP optical module can be delivered as an option with the Digital Diagnostic Monitor (DDM) feature which controls the temperature and the receiving and transmitting power very reliable for the management of optical interfaces and permit to optimize the life of the optical modules.

The maximum distance with direct SFP interconnection is 240km for STM1, 200km for STM16. But CXR supply external EDFA-PA, EDFA-BA and Raman amplifiers to rich in one jump up to 320km;

**The HX9400R series** can be managed locally over a console port or LAN port as a craft interface with a menu-driven interfaces or remotely via DCC channel or in-band/out-band LAN with a menu-driven or in SNMP.

For centralized administration of the SDH and PDH equipments CXR proposes a light solution named **CXRView-Plus** and a very power Telecommunication system (TMS) named the **CXR-iNMS**.

**CXRView-Plus** is a NMS system based on SNMPc from Castle Rock an SNMP management. Over a Windows interfaces the user can setup, monitor all devices, store and restore configuration and software release and their update and exchange of PDH/SDH devices and the user can show the active status of all links between devices.

The **CXR-iNMS** is a powerful SDH EMS/NMS. It provides a complete set of operation interfaces that are consistent with the Telecommunication Management Network (TMN) concept (ITU Recommendation M.30,G.784) for SHD Network Element/Operations System (NE/OS), NE/NE, and NE/Craft communications. This system give the possibility to create circuits end to end with automatic commissioning of the traversed PDH and SDH nodes.
The HX9416R structure with two CPU/Aggregate HX9400R-CC16 give it the possibility to deploy different topologies of SDH aggregates and tributaries. This configuration support 2 SNCP ring STM1/4/16 or 2 MSP 1+1 or one SNCP + MSP (1+1) STM1/4/16 ring with 4 fibers or 4 independent STM1/4/16. Each interface STM1, STM4 or STM16 are independent and can be selected by the selection of optical module or the settling for multi-rate SFP module.
This mains interfaces are also supporting serial or bus topologies as a drop insert (ADM) or as a simple or double Terminal Multiplexer (TM).

The HX9400R can also provide a mix of ring and TM. This can be STM1 or STM4 link depending of settling and optical module selection.
The SNCP MESH feature gives the possibility to mix several SNCP protection and to share VC4-x pipe with different circuits protected in SNCP. This is possible only with HX9400R-CC16 CPU/Cross-connect. It is possible at VC4, VC3 or VC12 level.

### Maximum of Tributaries Ring and Bus

#### CCU16 SNCP Ring Configuration:

- 2 * CC16 aggregate STM-16 Ring
- 8 * STM-1 Ring (Tributary)
  - 2 * STM-1 Slot 1&3
  - 2 * STM-1 Slot 2&4
  - 2 * STM-1 Slot 5&7
  - 2 * STM-1 Slot 6&8
- 2 * STM-4 Ring (Tributary)
  - 1 * STM-4 Slot 1&3
  - 1 * STM-4 Slot 5&7

#### Capacity BW Slot:

- Trib Group #1 = 4 *VC4 Slot 1&2
- Trib Group #2 = 4 * VC4 Slot 3&4
- Trib Group #3 = 4 * VC4 Slot 5&6
- Trib Group #4 = 4 * VC4 Slot 7&8
  
  Or 2 VC4 per Slot for E1, Ethernet
### HX9416R Capacity with 2 CC16

**SDH STM16/4/1 INFRASTRUCTURE**

#### TRIBUTARY GROUP

<table>
<thead>
<tr>
<th>TRIBUTARY GROUP</th>
<th>TG 1</th>
<th>TG2</th>
<th>AGGREGATES</th>
<th>TG3</th>
<th>TB4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SLOTS</strong></td>
<td>TRIB 1</td>
<td>TRIB 2</td>
<td>TRIB 3</td>
<td>TRIB 4</td>
<td>CC16 W</td>
</tr>
<tr>
<td><strong>GLOBAL PAYLOAD SDH</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 X 155M</td>
<td>N/A</td>
<td>4 X 155M</td>
<td>N/A</td>
<td>2 x 2.5G</td>
<td>2 x 2.5G</td>
</tr>
<tr>
<td>2 x 155M</td>
<td>2 x 155M</td>
<td>2 x 155M</td>
<td>2 x 155M</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Link without MSP</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STM-4 N/A</td>
<td>STM-4 N/A</td>
<td>STM-4 N/A</td>
<td>STM-1/4/16 (2 ports)</td>
<td>STM-1/4/16 (2 ports)</td>
<td>STM-4 N/A</td>
</tr>
<tr>
<td><strong>Link with MSP (1+1)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STM-1 (2 ports)</td>
<td>STM-1 (2 ports) (P)</td>
<td>STM-1 (2 ports)</td>
<td>STM-1/4/16 (2 ports)</td>
<td>STM-1/4/16 (2 ports)</td>
<td>STM-1 (2 ports)</td>
</tr>
<tr>
<td>STM-4 (P)</td>
<td>STM-4 (P)</td>
<td>STM-4 (P)</td>
<td>STM-1/4/16 (2 ports)</td>
<td>STM-1/4/16 (2 ports)</td>
<td>STM-4 (P)</td>
</tr>
</tbody>
</table>

#### Maxi 504 E1

- 63 E1
- 63 E1 or 252 (1+1)
- Max. 24 E3 or 12 (1+1)

#### 64 FE or 8 GE w/o protection

- 8 FE or 1 GE
- 8 FE or 1 GE (P)
- 8 FE or 1 GE (P)
- 8 FE or 1 GE (P)

#### 64 FE or 8 GE w 1+1 protection

- 8 FE or 1 GE
- 8 FE or 1 GE (P)
- 8 FE or 1 GE (P)
- 8 FE or 1 GE (P)

#### 56 FOM w/o protection

- 7 FOM
- 7 FOM (P)
- 7 FOM (P)

#### 56 FOM w 1+1 protection

- 7 FOM
- 7 FOM (P)
- 7 FOM (P)
## SDH STM16/4/1 INFRASTRUCTURE

### ORDER NUMBERS

| HX9400R-6U | Main chassis 6U, STM1/4/16 or OC3/12/48 modular system w/o modules, CPU & power supply |
| HX9400R-CB | Connector board (1 per chassis) |
| HX9400R-FAN | Fan board (1 per chassis) |
| HX9400R-CC4 | CPU card with cross-connet and 2 aggregate STM1/4 or OC3/12 with 2 SFP slots w/o SFP module (2 per chassis) |
| HX9400R-CC16 | CPU card with cross-connect and 2 aggregate STM1/4/16 or OC3/12/48, with 2 SFP slots w/o SFP module (2 per chassis) |
| HX9400R-DC48 | DC power supply for HX9400-6U, -48v (2 per chassis) |
| HX9400R-ACDC | AC power supply for HX9400-6U and DC 48v (2 per chassis) |

### TRIBUTARY CARDS

| HX9400R-ADSTM1/4 | ADM for 2 STM1 or 1 STM4 with 2 SFP slots |
| HX9400R-16E1/T1 or E1-75 | Tributary card 16 E1-120ohms and 16 T1-100ohms or 16 E1-75ohms |
| HX9400R-32E1/T1 or E1-75 | Tributary card 32 E1-120ohms and 32 T1-100ohms or 32 E1-75ohms |
| HX9400R-43E1/T1 or E1-75 | Tributary card 63 E1-120ohms and 63 T1-100ohms or 63 E1-75ohms |
| HX9400R-3DSE3 | Tributary card 3 E3 or 3 DS3 |
| HX9400R-DSM313 | Software M3 for HX9400R-3DSE3, support only DS3 to 2/1E1 or 2B1T |
| HX9400R-SWM-GTX-8TTX | Ethernet tributary card manageable switch level 2 with 1000BaseT and 8 x 10/100BaseT, 8 WAN, GE and FE cannot be used together, support E-LINE and E-LAN |
| HX9400R-GTX-8TTX | Ethernet tributary card manageable without switch, 1x 1000BaseT and 8 x 10/100BaseT, 8 WAN, GE and FE cannot be used together, support E-LINE only |
| HX9400R-2CB-2QSF | Ethernet tributary card manageable with switch, 2x 10/100/1000BaseT and 2 Combo 10/100/1000BaseT and 2 SFP, 64 WAN support E-Line and E-WAN. (Q1 2013) |
| HX9400R-7FOM | Tributary card with 7 fiber optic SFP compatible with QX4400-4ET1O. w/o modules SFP type STM1-xx |

### SFP MODULES

| HX9400R-PAN-PW | PAN for power supply HX9400R and HX9500R |
| HX9900-R-FLTER | 1U chassis for HX9400/9500/9550 with air filter to use under the multiplexer |
| HX9900-R-FLTER-CBL-T | 2U chassis for HX9400/9500/9550 with air filter and cable management to use under the multiplexer |
| HX9400R-MANUAL-F | Printed HX9400R French manual |
| HX9400R-MANUAL-E | Printed HX9400R English manual |

**SFP MODULES**

- **SFP-STM1-E**
  - SFP module STM1 electrical

- **SFP-STM1-MM2**
  - SFP module 100FX, STM1 - OC1 single mode 1310 for 2km, LC

- **SFP-STM1-SM30D**
  - SFP module 100FX, STM1 - OC3 single mode 1310 for 30km, LC, w ith DDM

- **SFP-STM1-SM50D**
  - SFP module 100FX, STM1 - OC3 single mode 1310 for 50km, LC, w ith DDM

- **SFP-STM1-SM15-W13**
  - SFP module 100FX, STM1 - OC3 single mode CWDM 1210 for 16km, LC, must be used face to SFP-100FX, STM1 - OC3-SM15-W13-LC

- **SFP-STM1-SM15-W15**
  - SFP module 100FX, STM1 - OC3 single mode CWDM 1550 for 16km, LC, must be used face to SFP-100FX, STM1 - OC3-SM15-W15-LC

- **SFP-STM1-SM60-W13**
  - SFP module 100FX, STM1 - OC3 single mode CWDM 1210 for 60km, LC, must be used face to SFP-100FX, STM1 - OC3-SM60-W13-LC

- **SFP-STM1-SM60-W15**
  - SFP module 100FX, STM1 - OC3 single mode CWDM 1550 for 60km, LC, must be used face to SFP-100FX, STM1 - OC3-SM60-W15-LC

- **SFP-STM1-SM150-15D**
  - SFP module 100FX, STM1 - OC3 single mode 1550 for 100km, LC, w ith DDM

- **SFP-STM1-SM120-15D**
  - SFP module 100FX, STM1 - OC3 single mode 1550 for 120km, LC, w ith DDM

- **SFP-STM1-SM160-15D**
  - SFP module 100FX, STM1 - OC3 single mode 1550 for 160km, LC, w ith DDM

- **SFP-STM1-SM200-15D**
  - SFP module 100FX, STM1 - OC3 single mode 1550 for 200km, LC, w ith DDM

- **SFP-STM1-SM240-15D**
  - SFP module 100FX, STM1 - OC3 single mode 1550 for 260km, LC, w ith DDM

- **SFP-STM1-SM80-CxxD**
  - SFP module 100FX w ith 50km, CWDM lambda au choix de 1430 to 1610nm, budget 29 dB, for 80km, connector LC

**100FX, STM1/STM4-OC3/OC12 SFP MODULE, Standard range -5 to +70°C**

- **SFP-STM4-MM1D**
  - SFP module STM4/OC12 multi mode for 10kmLC, w ith DDM

- **SFP-STM4-14/SM10**
  - SFP module 100FX, STM4/STM4 - OC3/OC12 single mode for 10kmLC

- **SFP-STM4-14/SM20D**
  - SFP module 100FX, STM4/STM4 - OC3/OC13 single mode for 20kmLC, w ith DDM

- **SFP-STM4-14/SM40D**
  - SFP module 100FX, STM4/STM4 - OC3/OC13 single mode for 40kmLC, w ith DDM

- **SFP-STM4-14/SM50D**
  - SFP module 100FX, STM4/STM4 - OC3/OC13 single mode for 50kmLC, w ith DDM

- **SFP-STM4-14/SM80-15D**
  - SFP module 100FX, STM4/STM4 - OC3/OC13 single mode for 80kmLC, w ith DDM

- **SFP-STM4-14/SM100-15D**
  - SFP module 100FX, STM4/STM4 - OC3/OC13 single mode for 100kmLC, w ith DDM

- **SFP-STM4-120/15D**
  - SFP module STM4/OC12 single mode for 120kmLC, w ith DDM

- **SFP-STM4-160/15D**
  - SFP module STM4/OC12 single mode for 160kmLC, w ith DDM

- **SFP-STM4-200/15D**
  - SFP module STM4/OC12 single mode for 200kmLC, w ith DDM

**STM16/OC48, GE, 2GE SFP MODULE, w ith DDM Standard range -5 to +70°C**

- **SFP-STM16-15D**
  - SFP module STM16/OC48 single mode 1310 DBF for 10km, LC, w ith DDM

- **SFP-STM16-40D**
  - SFP module STM16/OC48 single mode 1550nm for 40km, LC, w ith DDM

- **SFP-STM16-1550D**
  - SFP module STM16/OC48 single mode 1550nm for 80km, LC, w ith DDM

- **SFP-STM16-120/15D**
  - SFP module STM16/OC48 single mode 1550nm DBF for 120km, LC, w ith DDM

- **SFP-STM16-160/15D**
  - SFP module STM16/OC48 single mode 1550nm DBF for 160km, LC, w ith DDM

- **SFP-STM16-75D**
  - SFP module STM16/OC48 single mode, CWDM Cxx, DBF for 40km, LC, w ith DDM

- **SFP-STM16-120DWXxD**
  - SFP module STM16/OC48 single mode, DWDM Cxx, DBF for 120km, LC, w ith DDM
**Physical/Electrical**

- Physical/Electrical Clock Source
- Up to 4 clocks with priority from:
  - Internal,
  - STM
  - STM-N Line 4 aggregate or 6 tributaries,
  - 2 External input 2MHz or G704 w or w/o SSM,
  - E1 PDH source,
- 2 output clocks

**Management Interface**

- Console port DB-9 and Ethernet
- E1/T1 interface connector SCSIIII 68 pins
- Optical Interface connector SFP module with LC connectors
- Number of Optical STM-x Up to 4 STM16, 4 STM4 or 16 STM1
- Number of E1/T1 channels Card of 16E1/T1, 32 E1/T1 or 63 E1/ 63T1

**Clock Source**

- Up to 4 clocks with priority from:
  - Internal,
  - STM-N Line 4 aggregate or 6 tributaries,
  - 2 External input 2MHz or G704 w or w/o SSM,
  - E1 PDH source,
- 2 output clocks

**Alarm Input/Output**

- Inputs
  - Ports 4
  - Internal resistance 1K
  - Activation current 3 mA
  - Deactivation current 1.5 mA
- Connectors RJ45

- Outputs
  - Ports 4
  - Initial insul. resist. Min. 100M ohm (at 500Vdc)
  - Maximum switching voltage 110 Vdc, 125 Vac
- Connectors RJ45
- Use SNMP TRAP or Transmission from Input to Output

**Standards Compliance**

- ANSI T1.105, T1.107
- IEEE 802.1q & 802.1ad(VLAN), 802.1w(RSTP), 802.1s(MSTP), 802.3x(flow control), 802.3u, 802.1p(QoS)

**Certification**

- EMC: FCC Part 15 Subpart B, Class A; EN 55022, Class A; EN55024; EN300 386
- In test for DC48v only:
  - IEC61850-3, IEEE1613 for utilization in electric substation
- SAFETY: IEC60950-1/EN 60950-1
**SDH STM16/4/1 INFRASTRUCTURE**

**SPECIFICATIONS 2/4**

**Maximum Cross-connect Aggregate module HX9416R**
- HX9400R-CC16 owns dual SFP STM1/4/16 or OC3/12/48 ports, supports 2 x 16 VC4 Payload
- Chassis support maximum 2 HX9400R-CC16 or supports 4 x 16 VC4 Payload aggregate

**Maximum Number of Tributary Modules**
- 4 STM4/OC12
- 16 STM1/OC3
- 504 E1/T1 Tributaries
- 24x DS3/E3 Tributaries
- 8 x Gigabit Ethernet Tributaries

**Optical STM16/STM4/STM1 aggregate line: HX9400R-CC16 card**
- **Card**
  - CPU with 2 SFP slot for STM1/4/16 or OC3/12/48 modules
- **SFP module w DDM**
  - Dual uni-directional fiber 1310 or 1550nm up to 160km in STM16
  - Single bi-directional fiber WDM 1310 and 1550nm up to
  - Dual uni-directional fiber CWDM 80km
  - Dual uni-directional fiber DWDM up to 120km in STM16
- **Long distance fiber**
  - CXR can provide solution with EDFA-PA, EDFA-BA and Raman Amplifier to reach maximum: 310km for STM1/STM4 and 260km for STM16
- **CPU**
  - Fiber section is independent of the CPU, the Fiber section can work if the CPU is off.

**Tributary STM1/STM4 card HX9400R-ADSTM1/4**
- **Optical interfaces**
  - 2 SFP slots for 2 STM1 or 1 STM4 modules
- **Payload support**
  - See table with according to the tributaries groups # 1, 2, 3 and 4
- **Maximum number of card**
  - 8 cards with 2 SFP STM1
  - 4 cards with 1 SFP STM4
  - 4 +4 cards with 1 SFP STM4 in 1+1 protection

**Tributary 4STM1/OC3 card HX9400R-4STM1-OC3**
- **Optical interfaces**
  - 4 SFP slots for 4 STM1/OC3 module
- **Payload support**
  - See table with tributaries groups # 1, 2, 3 and 4, usable with HX9416R only

**Tributary 7 FOM for QX3440 card HX9400R-7FOM-4E1**
- **Optical interfaces**
  - 7 SFP slot for 7 FO link to QX3440-4E14FO in QX3440, QX3440S and QX3440D
  - Use SFP: SFP-STM1-MM or SMx
- **Payload support**
  - 7 x 4 E1 with independent clock
- **MSP 1+1**
  - 2 cards support 7 link of 4E1 to QX3440 with 1+1 PDH protection.

**HX9x00R with 2 HX9400R-7FOM**
**Tributary 16/32/63 E1 card: HX9400R-16E1/T1 or HX9400R-16E1-T5**

- **Line Rate**: 2.048 Mbps ± 50 ppm
- **Framing**: Unframed
- **Line Code**: AMI/HDB3
- **Input/Output Signal**: ITU G.703
- **Impedance**: 75ohms or 120ohms on order

**Tributary 16/32/63 T1 card: HX9400R-16E1/T1**

- **Line Rate**: 1.544 Mbps ± 32 ppm
- **Framing**: Unframed
- **Line Code**: AMI/B8ZS
- **Input Signal**: DSX-1 0dB to −30dB
- **Output Signal**: DSX-1 w/short haul (0-133, 133- 266, 266-399, 399-533, 533-655) (feet)
- **Impedance**: 100ohms

**Tributary 3 E3 card: HX9400R-3DS3E3**

- **Data Rate**: 34.368 Mbps ± 20ppm
- **Framing**: Unframed
- **Line Code**: HD3
- **Connector**: BNC connector
- **Impedance**: 75 Ohm Coax

**Tributary 3 DS3 card: HX9400R-3DS3E3**

- **Data Rate**: 44.736 Mbps ± 20ppm
- **Framing**: Unframed
- **Line Code**: B3ZS
- **Connector**: BNC connector
- **Impedance**: 75 Ohm Coax

**Software HX9400R-DS3M13**

- **M13**: Support multiplexing from one DS3 to 28 T1
- **G.747**: Support multiplexing from one DS3 to 21 E1
- **E13**: Attention NO NOT supports multiplexing from one E3 to x E1
**Tributary Ethernet/Gigabit Ethernet card: HX9400R-GTX-8TTX**

**Line Rate**
- 8 x 10/100 Mbps RJ45
- 1 x 10/100/1000 Mbps RJ45

**Mode**
- E-Line
  - Non switch card support 8 E-Line modes
  - FE and GE can't work together
- Point-to-Point
  - 8 WAN/LAN FE or 1 WAN/LAN GE

**Process Protocol**
- VCAT, GFP (G.7041), LAPS, LCAS (G.7042) and non-LCAS

**Tributary Ethernet/Gigabit Ethernet switch card: HX9400R-SWM-GTX-8TTX**

**Line Rate**
- 8 x 10/100 Mbps RJ45
- 1 x 10/100/1000 Mbps RJ45

**Mode**
- E-Line
- E-LAN
- Port-MAP
- Port-Trunking

**Layer 2 Protocol**
- RSTP (802.1W)
- VLAN (802.1Q, 802.1P)
- Flow Control (802.3X)
- MSTP (802.1S)
- IGMP Snooping
- QoS

**Process Protocol**
- VCAT, GFP (G.7041), LAPS, LCAS (G.7042) and non-LCAS

**Tributary Gigabit Ethernet switch card: HX9400R-2TGX-2UCB**

**Q1 2012**

This support will be particularly use with HX9400RA chassis TG2 which will support 2.4Gbps but will also work on other models with less WAN bandwidth;

**Line Rate**
- 8 ports Gigabit Ethernet
- 2 Optical ports with SFP 1000SX/LX
- 2 Combo 10/100/1000BaseT and SFP 1000SX/LX

**Bandwidth**
- Support 2.4Gbps or 16 VC4
- Need future chassis HX9400RA

**Mode**
- E-Line
- E-LAN
- Port-MAP
- Port-Trunking

**Layer 2 Protocol**
- RSTP (802.1W)
- VLAN (802.1Q, 802.1P)
- Flow Control (802.3X)
- MSTP (802.1S)
- IGMP Snooping
- QoS

**Process Protocol**
- VCAT, GFP (G.7041), LAPS, LCAS (G.7042) and non-LCAS
- BCP-PPP or EoS Layer 2 RFC2615 (Q4 2009)