



Next generation PASOLINK  
**iPASOLINK200/400/1000**

2010/12/27 7th ver.

# iPasolink Series

iPasolink is a modular network element that integrates a comprehensive set of TDM cross connect switching, packet switching and microwave / optical features, resulting in reduced costs and a long investments lifetime. The following iPasolink series cover mobile backhaul requirements all the way from the access tail links through to the metro aggregation network.

iPASOLINK 200



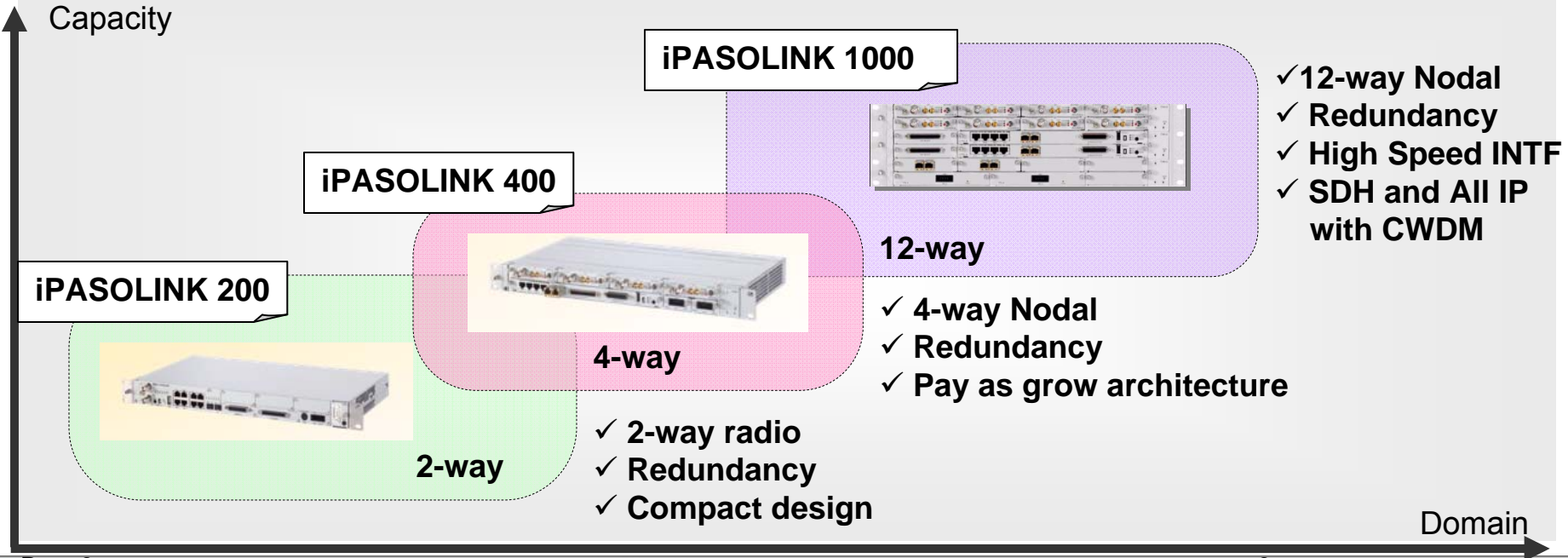
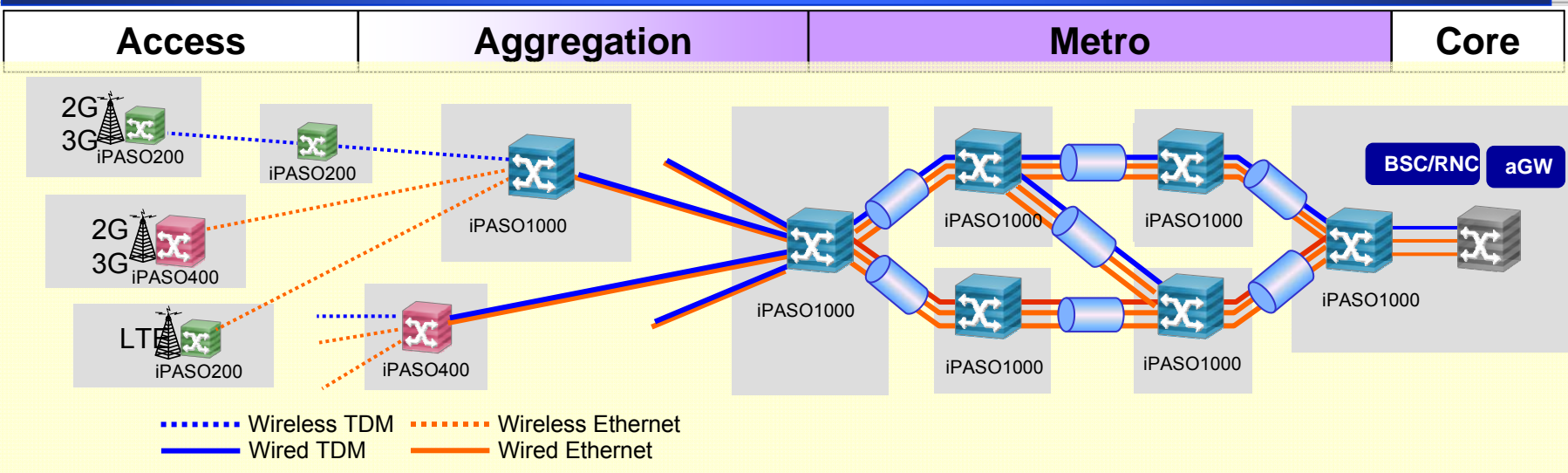
iPASOLINK 400



iPASOLINK 1000



# Positioning of iPASOLINK in Mobile Backhaul



# iPASOLINK - Next Generation Packet Radio -

## Converged Packet Radio for LTE & Next Generation Backhaul

### Designed for:

- Optimised, scalable and high capacity link throughput
- Transmission over both Microwave and Optical
- Carrier grade migration from TDM legacy to full IP Backhaul
- Application flexibility and software upgradeability

### Feature rich and highly compact

- Full packet radio with scalable throughput capability
- Hitless AMR up to 256QAM with adaptive QoS
- TDM and Ethernet ring support
- Full range of synchronization (TDM, Sync Eth)
- Multi-service support with PWE and aggregation
- Ethernet OAM, upgradeable to MPLS and IP transport
- Wide range of interfaces: E1, STM-1, FE, GbE



iPASOLINK 200



iPASOLINK 400



iPASOLINK 1000

2010



**iPASOLINK 200**

Capacity Optimised Radio for the extension of reach and capacity

2011



**iPASOLINK 400**

Intelligent Nodal Solution for traffic aggregation and bandwidth management

2012

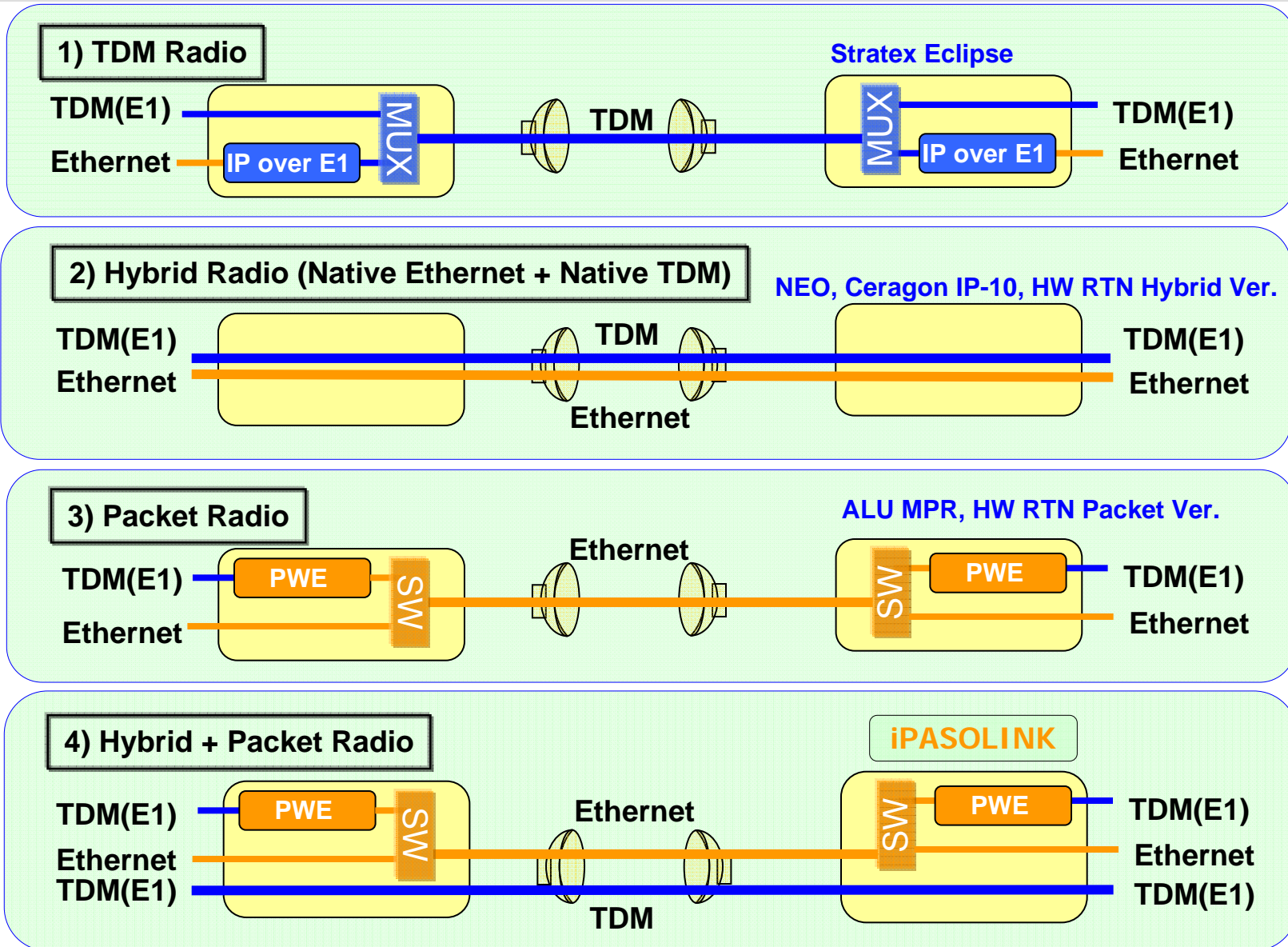


**iPASOLINK 1000**

Intelligent Node for Wireless and Optical network integration and Core Network handover

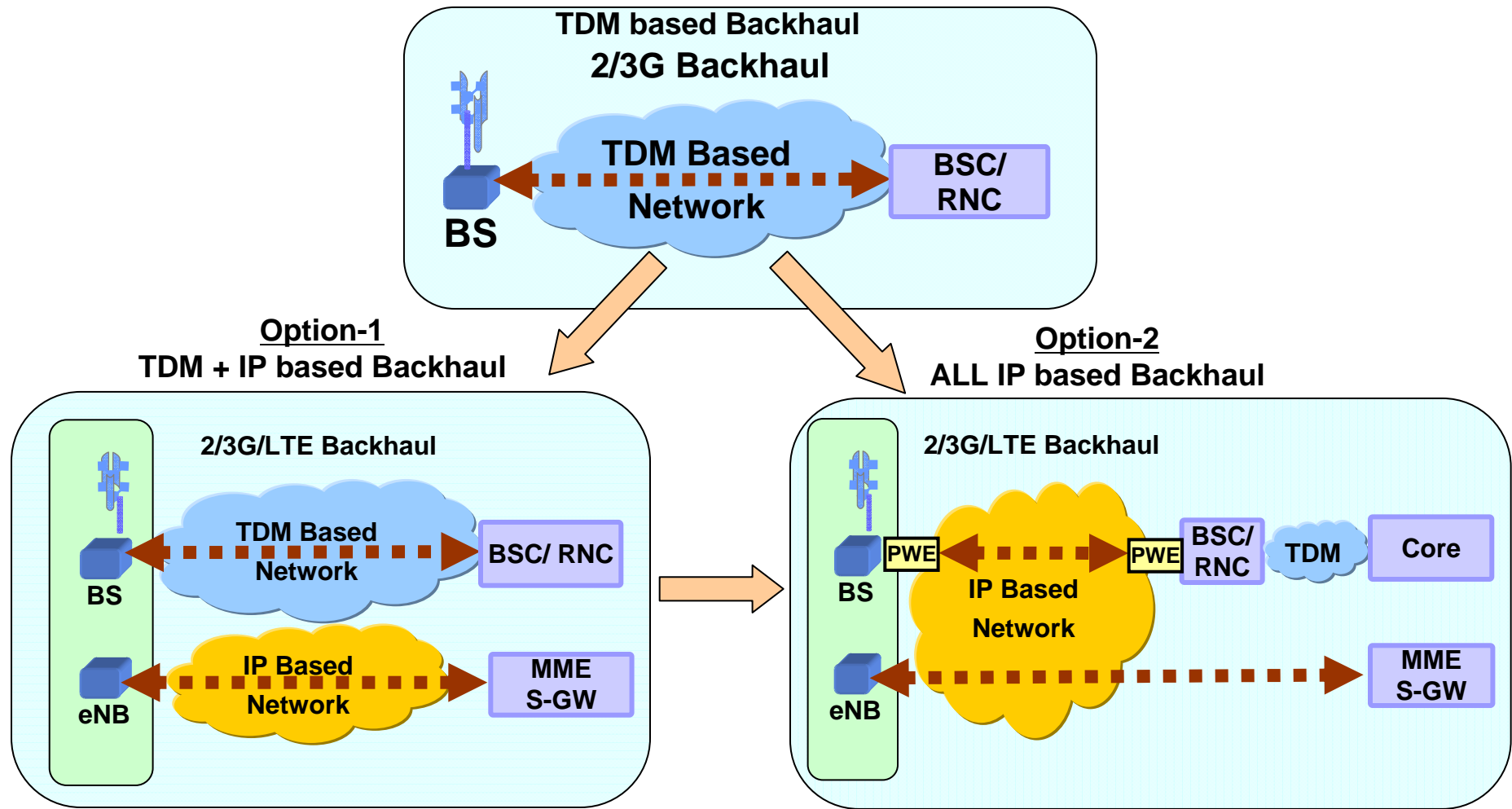
**iPASOLINK Roadmap**

# iPASOLINK Radio Transmission Method





# iPASOLINK capability for Evolution of Mobile Backhaul



**Only iPASOLINK can make these transitions on the same platform**

# iPASOLINK Series Functionalities Summary

		iPASOLINK 200	iPASOLINK 400	iPASOLINK 1000
Radio Nodal capability		Two way	4 Way	12 Way(Rel.1)
Interfaces	Main Board	16xE1 + 2xFE (or 4xGbE) + 2xGbE(SFP Slots)	16xE1 + 2xFE (or 2xGbE) + 2xGbE(SFP Slots)	4xGbE
	Optional	16xE1 card chSTM-1 card MSE card (16xE1 TDM PWE)	16xE1 card chSTM-1 with APS option card 4xGbE card (RJ-45x2 + SFPx2) MSE card (63xE1 TDM/ATM PWE) 10GbE card (for iPASOLINK 1000 Rel.2) CWDM card (for iPASOLINK 1000 Rel.2)	
Ethernet Functionality		Port based & Tag based VLAN CoS/ ToS/ Diffserv/ MPLS EXP based Priority Control Strict priority, D-WRR with Bandwidth Management Policing with CIR/EIR		
Synchronization		Synchronous Ethernet IEEE 1588v2		
TDM Cross-Connect		E1 Cross-Connect with ADM for Radio and chSTM-1		
TDM SW Capacity		E1 x 126ch		
Radio Protection		HS/HS,HS/SD,FD		
Resiliency	Packet	RSTP	RSTP, ITU-T G.8031/8032v2	
	TDM	E1 SNCP with Radio Ring		
Ethernet OAM		IEEE 802.1ag Service OAM and ITU-T Y.1731 PM		
Other Functions		XPIC, Traffic Aggregation	XPIC, Traffic Aggregation, ATM Aggregation	

# iPASOLINK 200 features overview

## iPASOLINK200 - High Performance Tail solution

- 1U single board, all-in-one model
- 16xE1, 2xFE (or 4xGbE) and 2xGbE(SFP) ports
- 2 AMR Modems are equipped on single main board.
- Configurable as 1+0, 1+1, 2+0 and 1+0 XPIC, by Software Key.
- Additional sub-board slots are available for 16E1, STM-1 or PWE.
- SNCP TDM ring and LAG for Ethernet

Full TDM to Full IP

Built-in TDM Cross-Connect(126E1x126E1) and Power-full Packet Switch

Enhanced system gain with new ODU(IHG)

Ether OAM, Sync ETH

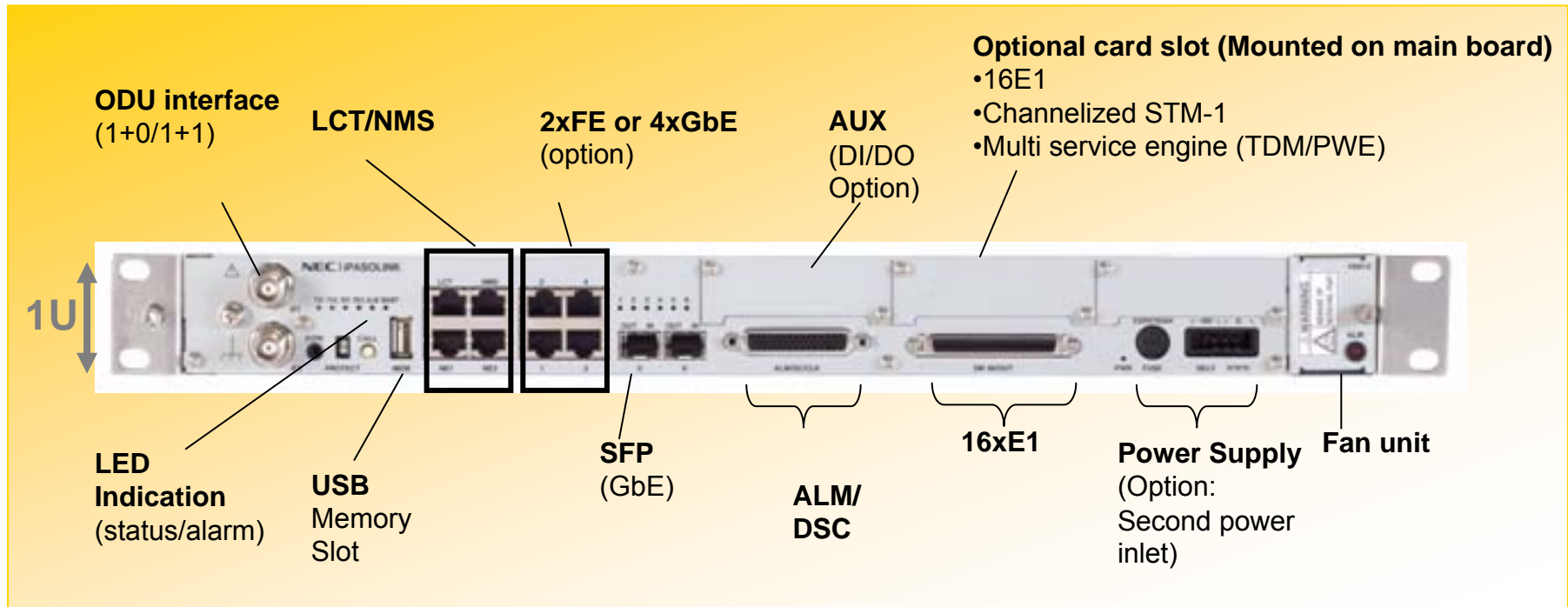




# iPASOLINK200

Presentation: Yes  
Submission : Yes

## Equipment Layout and Configuration Options



- “2 x FE (Electrical)” on the main board is set as “default”. By software key, it can be changed into “4 x GbE (10/100/1000Base-T)”
- “2xSFP(GbE)” can be set either “Optically” or “Electrically”. Same SFP type is required.
- “LCT/NMS interface” has “NE 1” and “NE2“. These interfaces are to be used for IDU-IDU back-to-back stacking.
- “AUX” interface” can be used e.g. for taking in alarms of air-conditioners, doors etc.
- Sync. ETH Clock module will be mounted onto the main board for Sync ETH, chSTM-1 etc..

# iPASOLINK 400 features overview

iPASOLINK400 – Flexible Converged Node for tail or 4way Nodal

- 1U with main card and 4 universal slots model.
- Main card with 16E1, 2xFE and 2 GbE(SFP).
- Flexible AMR modem configuration, 1+0, 2 to 4+0, 2x (1+1), 2x (1+0 XPIC) , 1x(1+1 XPIC), and modem-less optical node.
- Various Interface Card type
  - 16E1 card, 4xGE card, MSE card (for TDM PWE, ATM PWE), STM-1 card
- Converged Node for Wireless/Optical

Full TDM to Full IP

Built in TDM Cross-Connect(126E1x126E1) and Power-full Packet Switch

Enhanced system gain with new ODU(IHG)

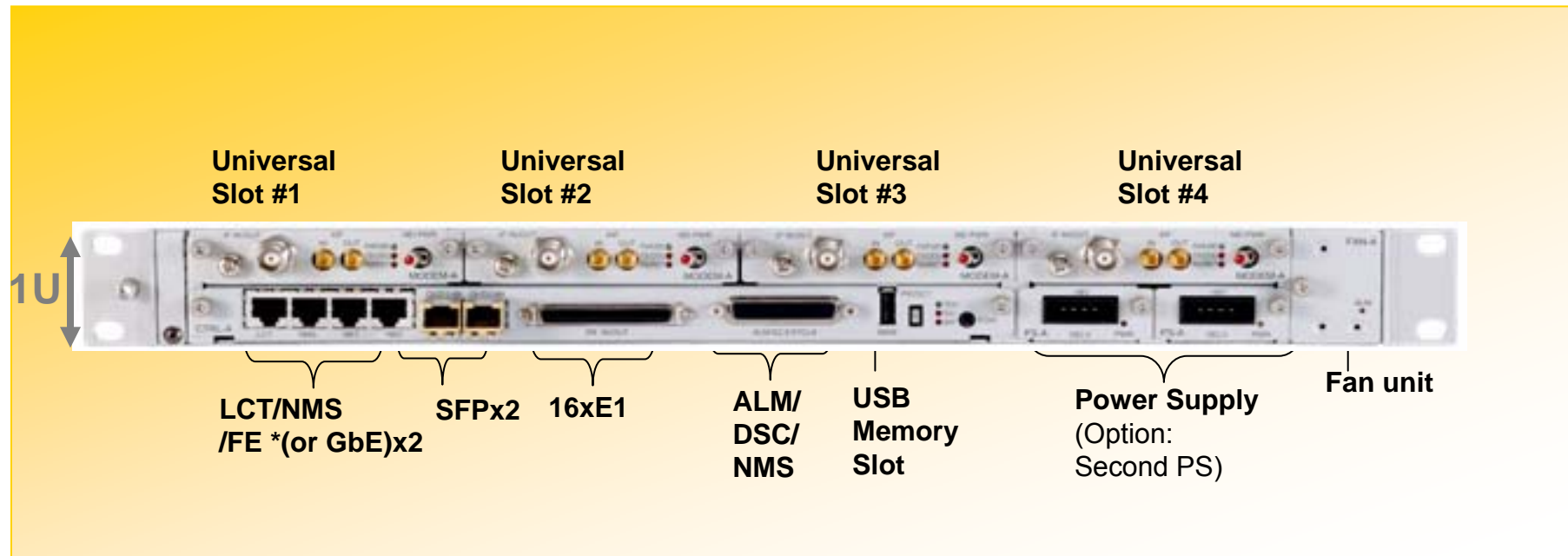
ETH OAM, Sync Ether



# iPASOLINK400

## Equipment Layout and Configuration Options

Presentation: Yes  
Submission : Yes



\*FE1 interface is used for FE (or GbE) or "NE1". "NE1" interface to be used for IDU-IDU back-to-back connection.

### Universal Slot Card Variation

- Modem (QPSK/16/32/64/128/256QAM, 7/14/28/56MHz)
- 16E1 TDM interface with digital cross connect (126E1 x 126E1)
- Multi-service engine for PWE3 interface (TDM/ATM PWE)  
. This function is available as the combination of nxE1 interface cards)
- STM-1 interface with 63E1 ADM function (electrical/optical, SFP), ASP supported as an option.
- 4xGbE interface(2xRJ45+2xSFP)
- AUX card for ALM/EOW/DSC  
(Sync. ETH Clock module will be mounted onto the main card.)

# iPASOLINK 1000 features overview

## Design Concept;

- 3U with 12 way(Rel.1)/10 way(Rel.2) Nodal Radio
- Redundant Main card (TDM/L2 Switch matrix with CPU)
- 10GbE, and CWDM Metro Network interface (Rel.2)
- Metro Ethernet Upgradable (i.e. MPLS-TP)

## Multi way Nodal Radio

- Satisfy most Nodal Node requirements
- Full Compatible with iPASOLINK400 modems

## Intelligent Converged Node

- Gateway for High Speed Optical Metro Network for LTE
  - Higher capacity optical network interface at Metro side. (Rel.2)
    - 10GbE
    - CWDM
  - Provides upgradable interoperability with Core MPLS cloud
- Independent handling of Native traffic
  - TDM with SNCP Ring
  - Carrier Class L2 switching with Ether Ring and 10GbE for Packet Traffic. (Rel.2)
- Scalable SW capacity from Multi-way nodal to Metro Optical node.

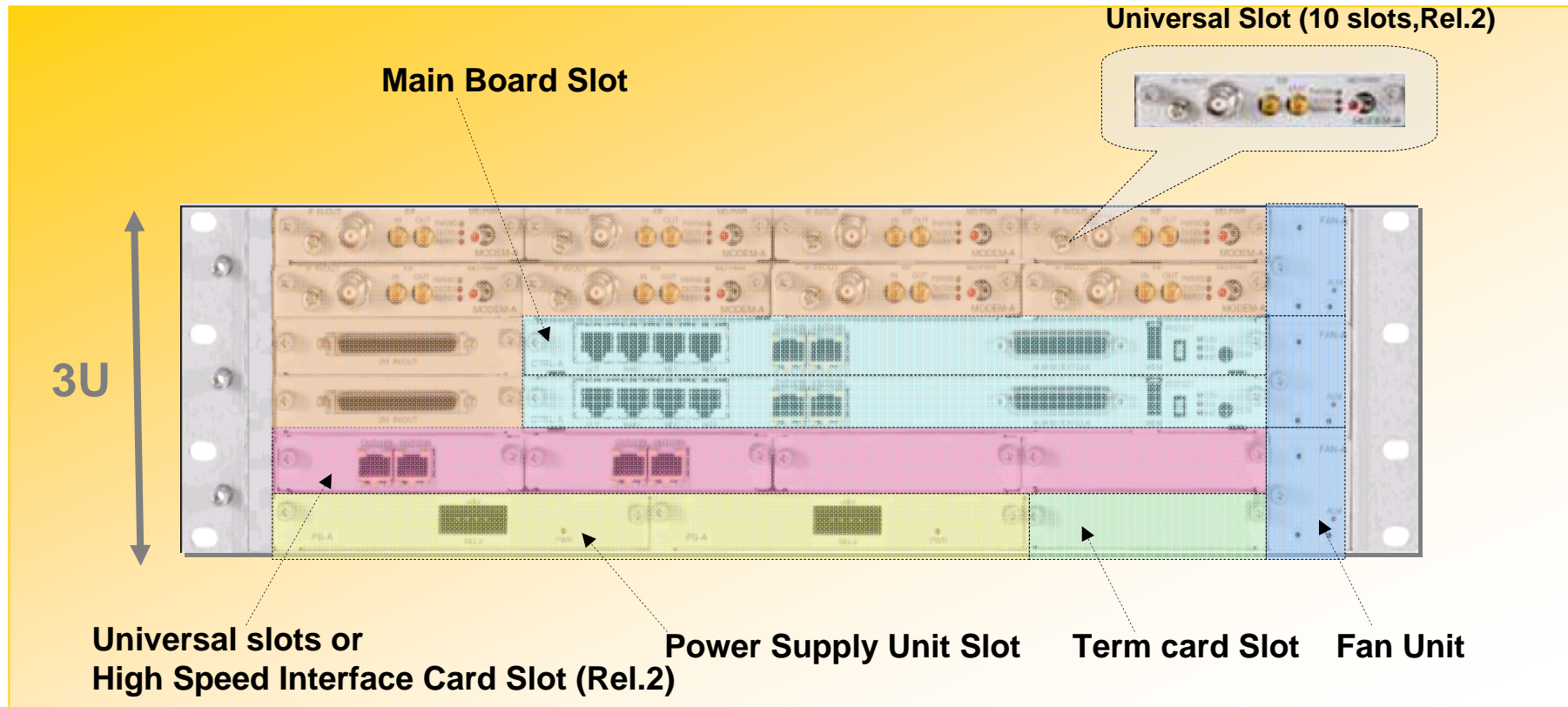




# iPASOLINK1000

## Equipment Layout and Configuration Options

Presentation: Yes  
Submission : Yes



- Universal Slot Card Variation (same as iPASOLINK 400)
- Main board Redundancy
- High Speed Interface card (10GbE, CWDM) (Rel.2)
- Main Board is not compatible with iPASOLINK 400
- TERM card for NMS connection
- No E1 in Main Board



# Scalable Modular Architecture - Universal Slot -

## 400 series

4 Universal Card Slots



### Universal Slots

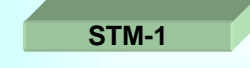
Any Universal Interface Card (Modem/INTFC) can be mounted on any Universal Interface Slot

#### ● Universal Interface Slot

✓ MODEM card



✓ INTFC card



etc.

✓ Multi-function card



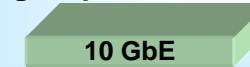
#### ● Main Card (Not a common card)

✓ MAIN INTFC

✓ CPU / Main SW (L2/TDM) / CLK

✓ LCT/NMS Port / ALM

#### ● High Speed Interface Slot ( Rel.2)



#### ● Term Slot

✓ NMS port

## 1000 series

10 Universal Card Slots (Rel.2)



# Enhanced Radio Performances with new ODU (IHG)

## ■Advanced Technologies and Superb Performance

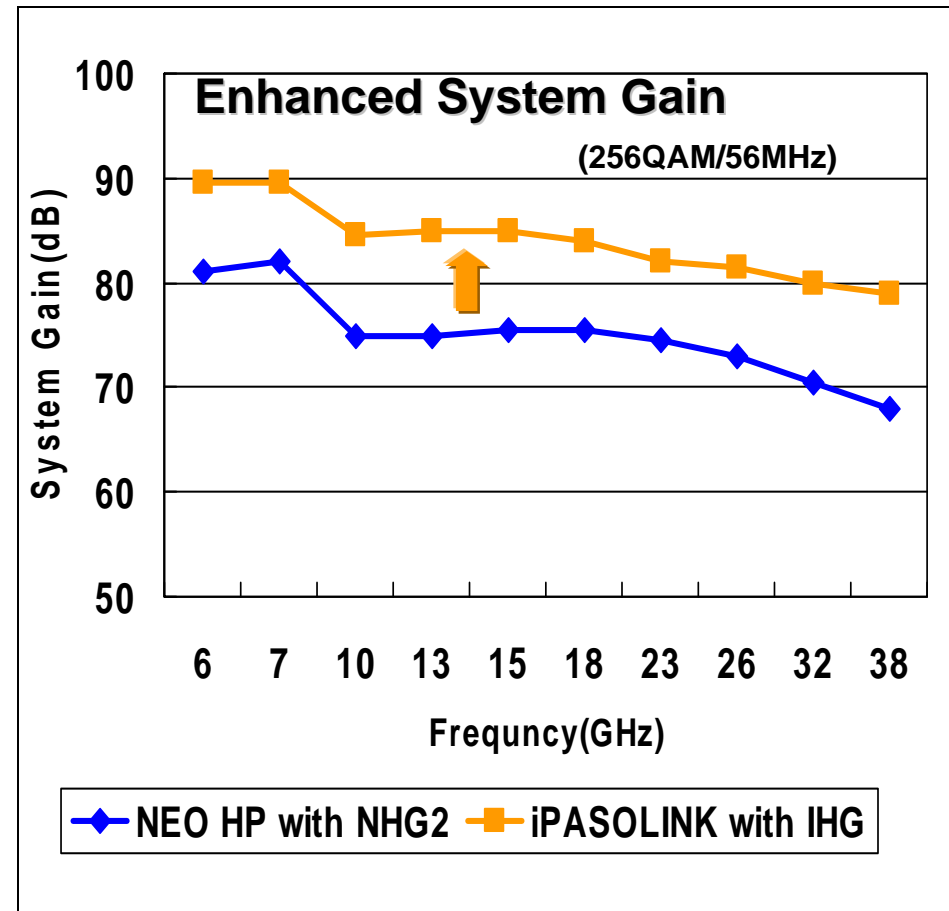
- High Modulation scheme (up to 256 QAM) for native Ethernet and native TDM transmission with high spectrum efficiency achieved by 256 QAM and by dual polarization transmission technologies.
- AMR Function with hitless modulation switchover.

## ■High System Gain

- High System Gain achieved by Low Density Parity Check (LDPC) Forward Error Correction (FEC) technology and distortion cancelling technique called linearizer allowing smaller antennas and reducing platform cost.

## ■Frequency Agility and Easy Tuning

- Field tunable to your licensed radio frequency channel within sub-band through Web based LCT.

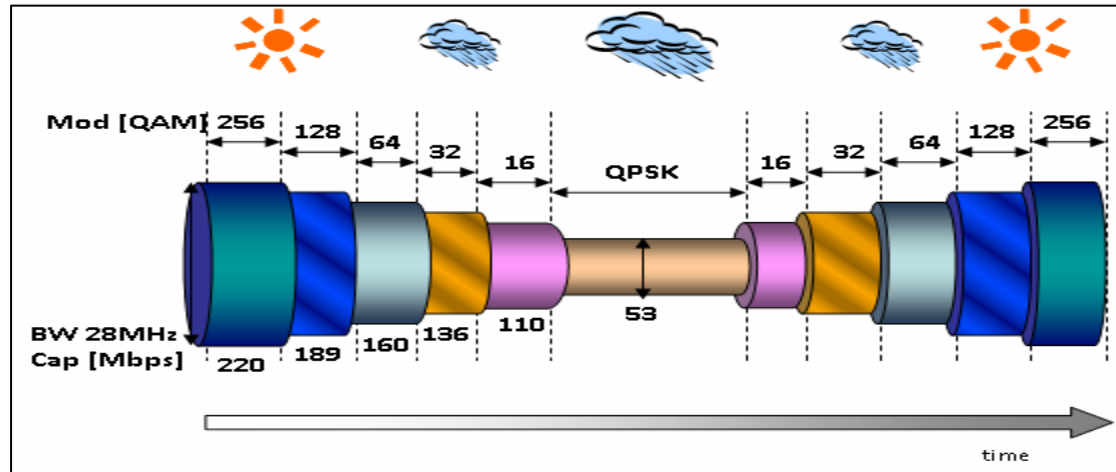


# Expanded AMR functionality

■ AMR is a technology to improve robustness mainly in the packet transmission environment by utilizing thermal threshold difference between modulation hierarchy such as QPSK and 256 QAM.

■ On the fine day, the operator can get the 220Mbps throughput over the link which is designed for 53Mbps throughput as illustrated in the figure.

■ iPASOLINK support hitless modulation switchover from 256QAM to QPSK as shown in table.



Available AMR operation mode

CS* / Modulation	Mode 1 7 MHz*	Mode 2 14 MHz*	Mode 3 28 MHz*	Mode 4 56 MHz*
QPSK	11 Mbps	26 Mbps	53 Mbps	110 Mbps
16 QAM	26 Mbps	53 Mbps	110 Mbps	220 Mbps
32 QAM	33 Mbps	66 Mbps	136 Mbps	273 Mbps
64 QAM	40 Mbps	80 Mbps	160 Mbps	320 Mbps
128 QAM	47 Mbps	94 Mbps	189 Mbps	388 Mbps
256 QAM	-	110Mbps	220 Mbps	441 Mbps

\*: Channel Separation - : Not applied

Note: Maximum throughput at 64 byte-passed rate based.

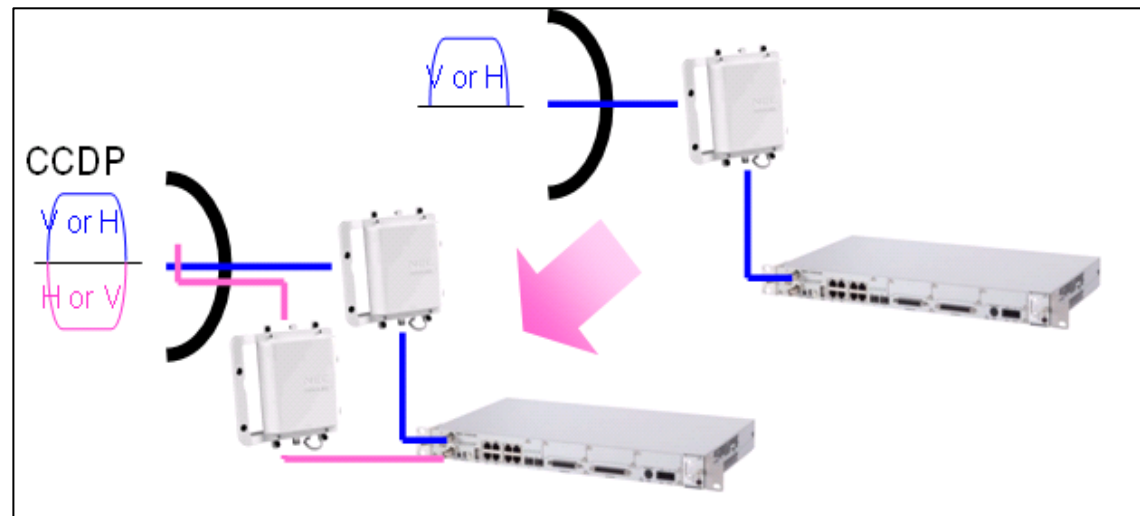
# iPASOLINK XPIC (Cross Polarization Interference Canceller)

iPASOLINK can double its transmission capacity up to 880Mbps in 56MHz bandwidth by adopting NEC's state of the art XPIC technology.

The additional required components for XPIC are;

- Dual polarized antenna,
- Additional ODU,
- Associated IF cable kit,
- Soft-key upgrade in IDU.

iPASOLINK400 can be configured 2 pair of XPIC links with one IDU.

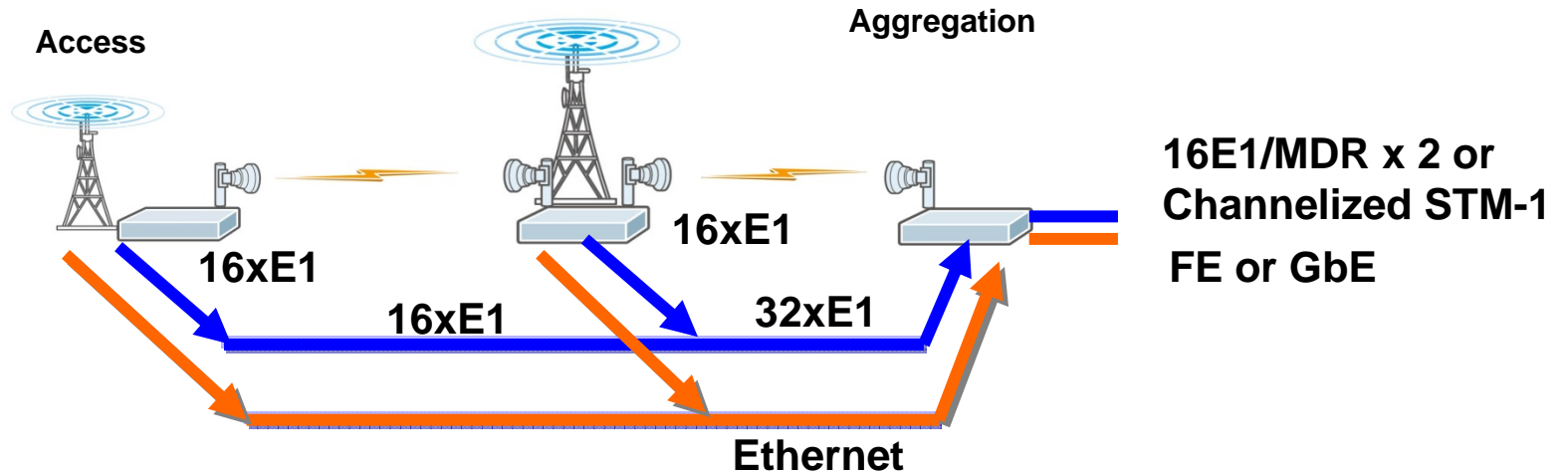


(In case of iPASOLINK200, no cable connection is required at the front panel for XPIC )

# Example of the network configuration with iPASOLINK

Presentation: Yes  
Submission : Yes

## 1) E1 with Ethernet Transmission



## 2) STM-1 with Ethernet transmission

