

Applying the Science of Networking



ITS, Camera, Sensors & Wi-Fi Backhaul

Bruce Hammergren Actelis

November 6, 2024 ITS WA

Proof Points of Actelis ITS Leadership

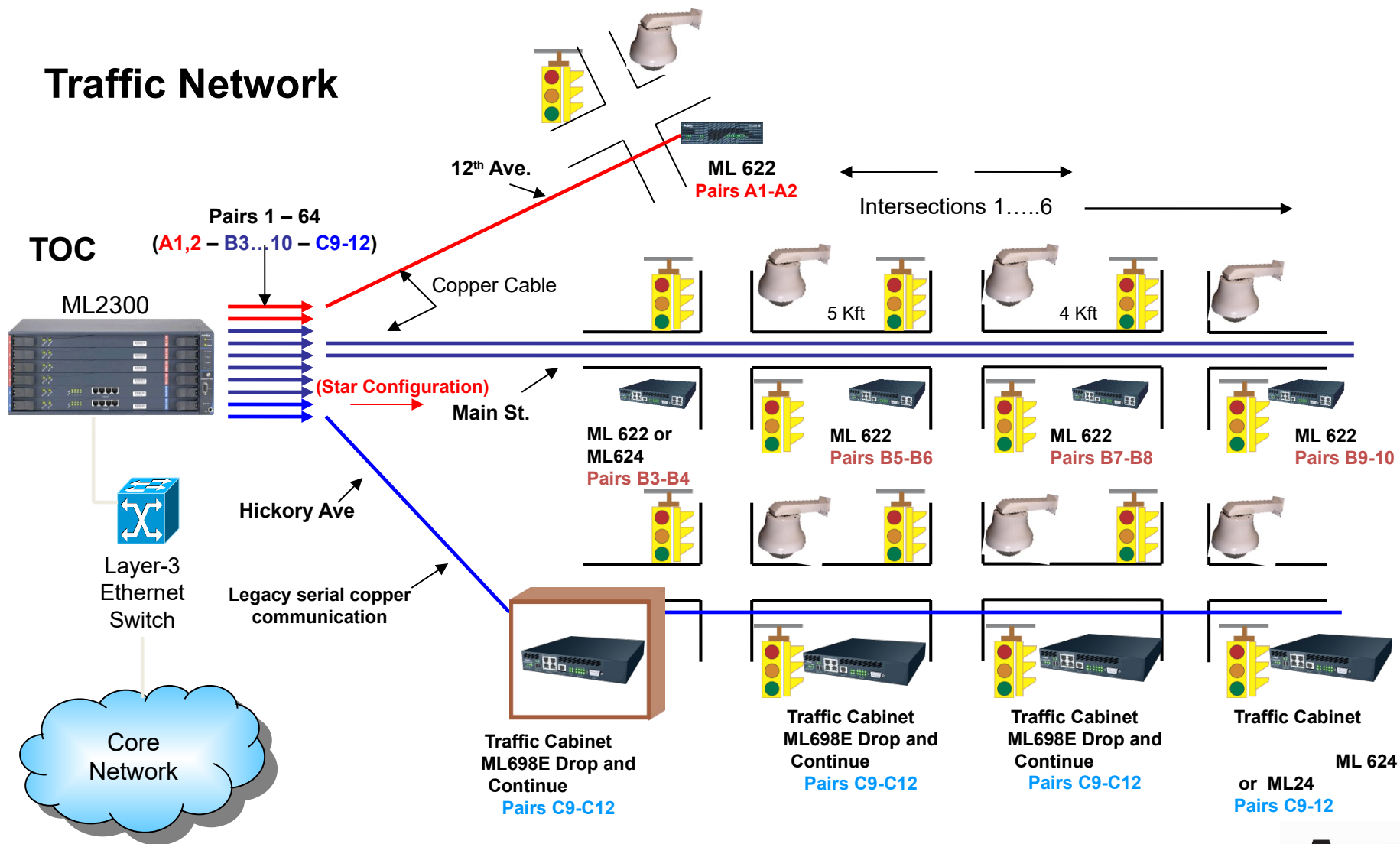


Over 350 US Cities
25 State DOT Deployments

Additional deployment in U.K., Germany, Canada

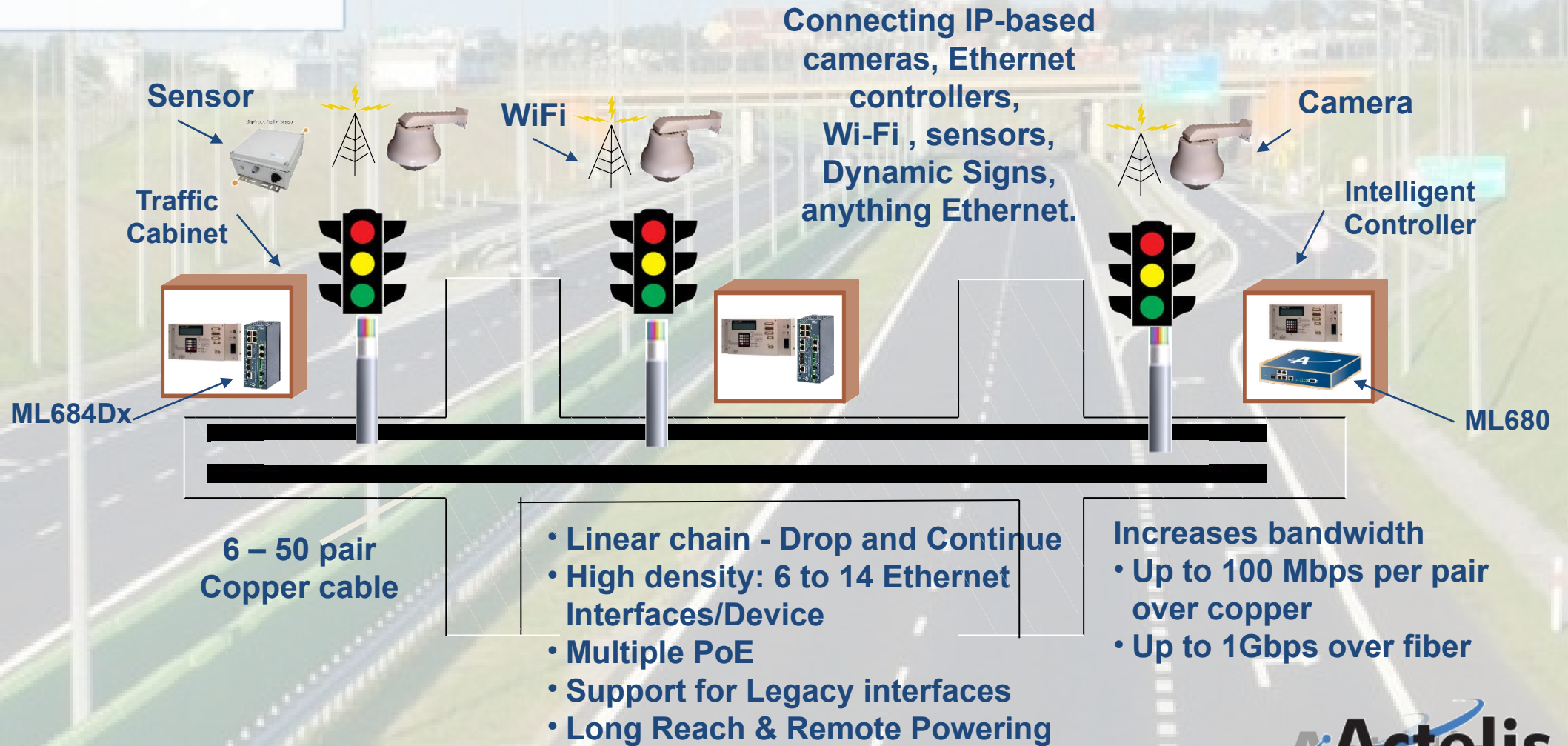
ML 600 EADs for ITS Traffic Networks *Multiple Intersections, Multiple Solutions*

Actelis Point to Multipoint Traffic Networks- P2MP

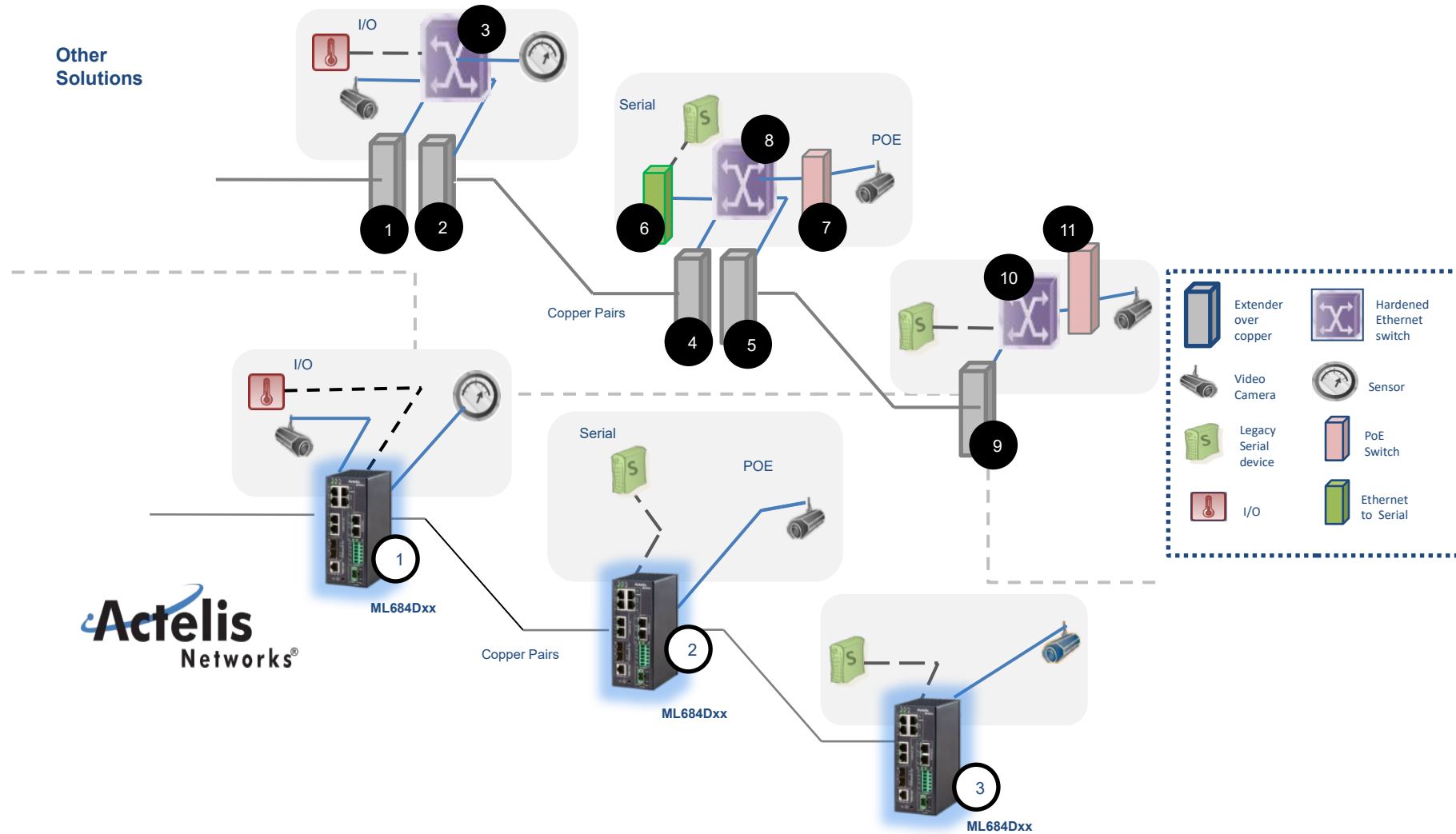


- Mission critical ITS solutions
- Supports real life data & video transport
- Enhances surveillance, safety and improving traffic flow
- Hardened

Enabling Smart Streets for Smart Cities



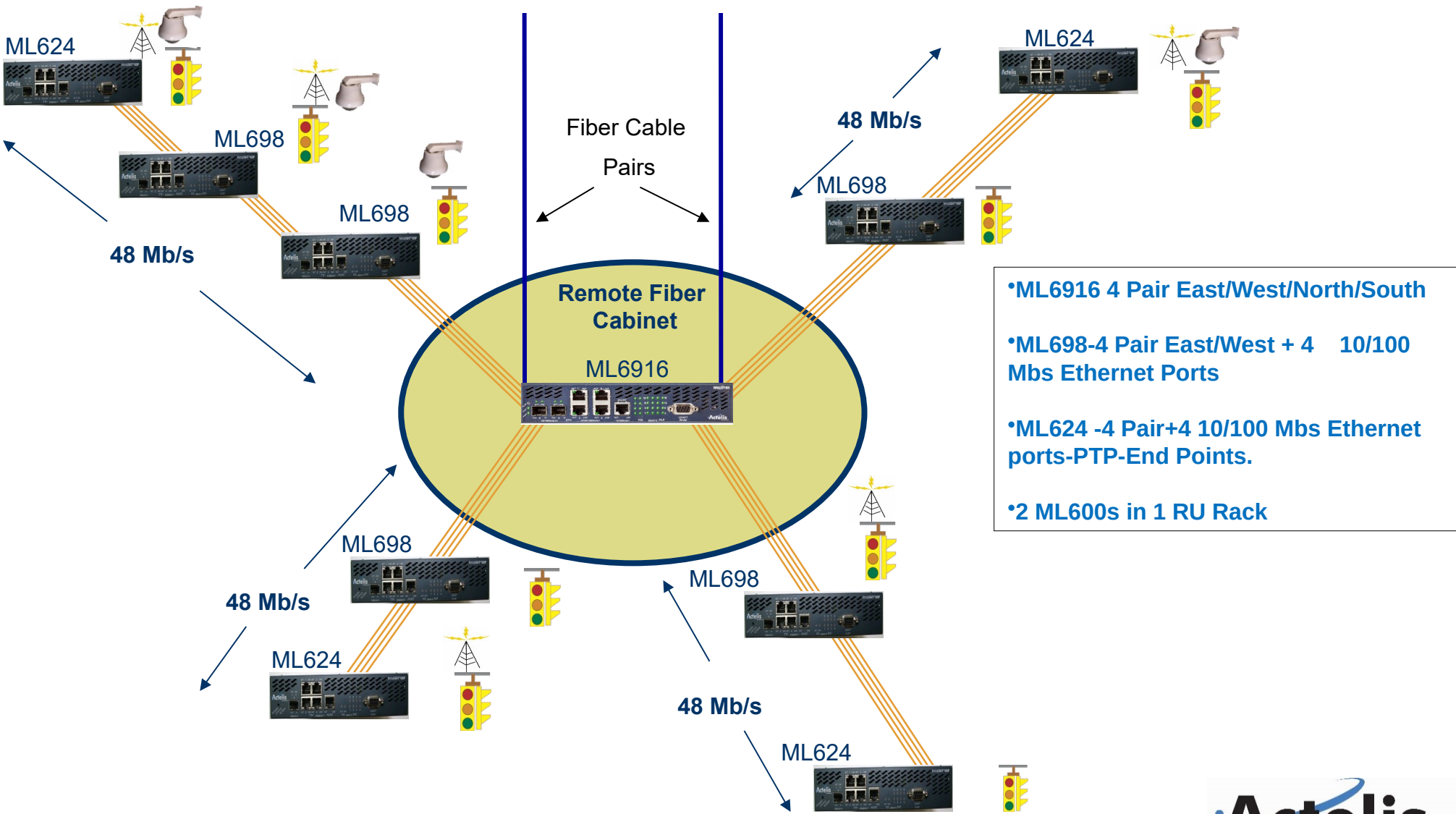
Highly Level of Integration: 3 Actelis Units Replace 11 Units



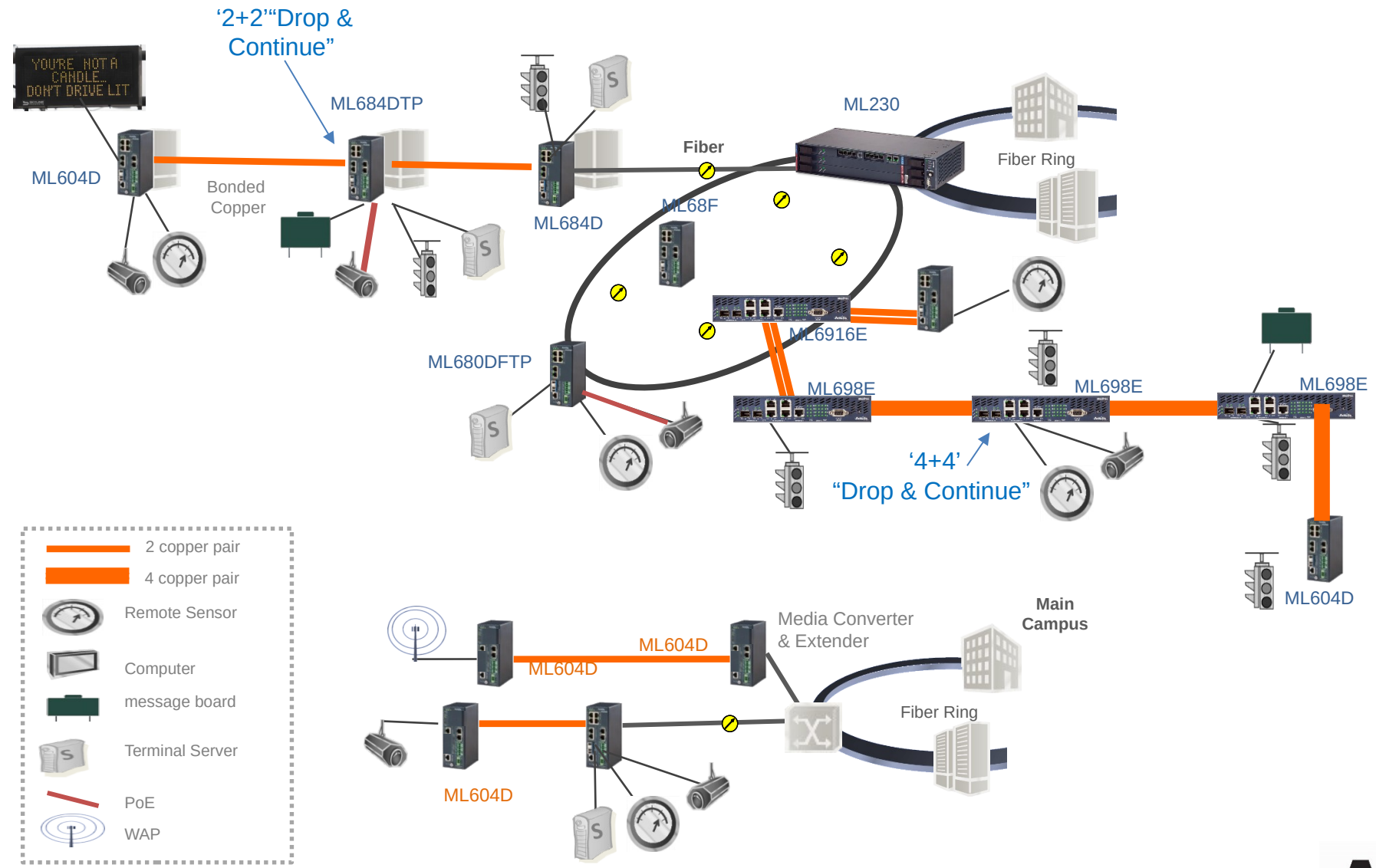
5

Remote Fiber Cabinets

Fiber, Copper Mixed Environments



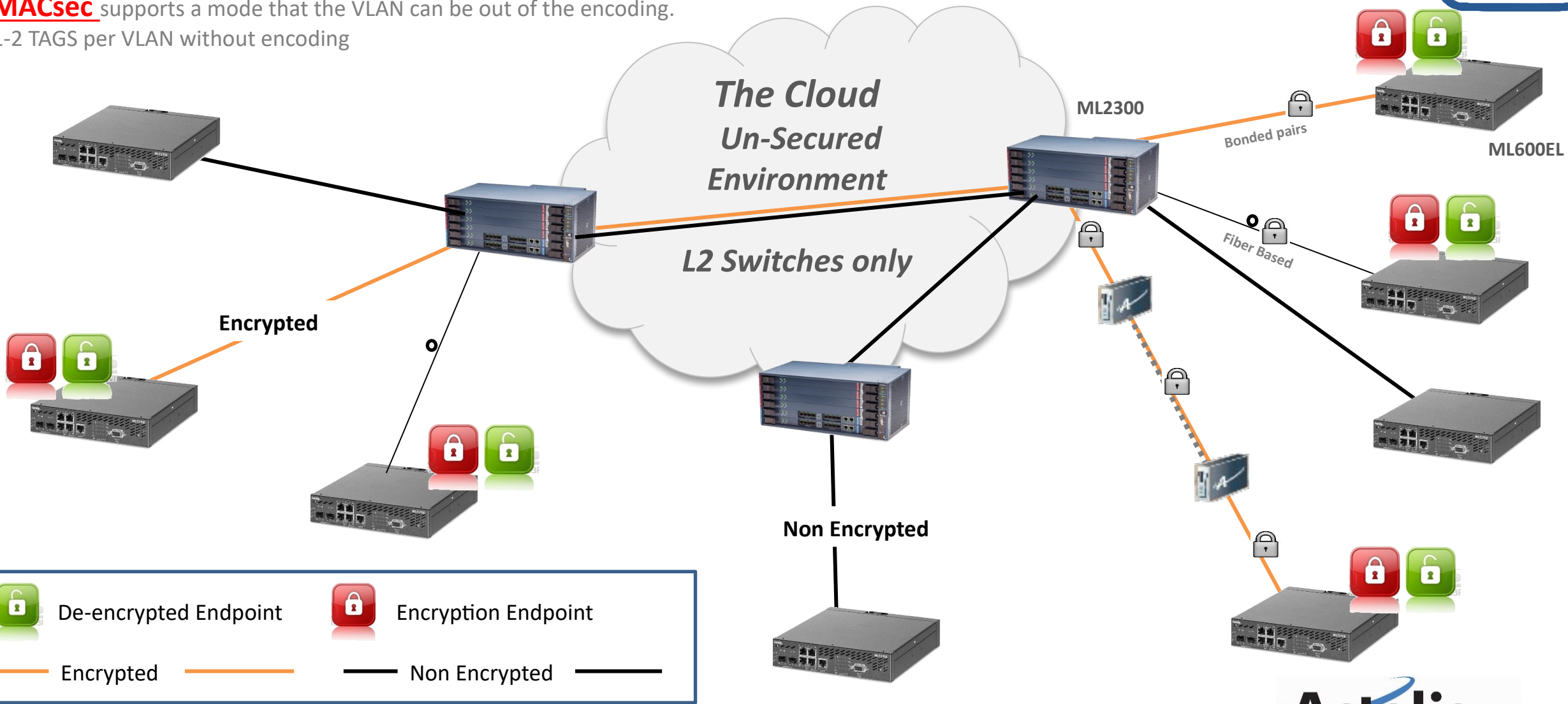
Intelligent Transportation Networks Copper & Fiber Solutions



MACsec Encryption for Enhanced Security – ML600EL



MACsec supports a mode that the VLAN can be out of the encoding.
1-2 TAGS per VLAN without encoding



Typical Cabinet Configuration



Rack Mount



IVC PTZ Video Camera and Cisco Wi-Fi



IVC PTZ Video Camera and Cisco Wi-Fi



New ML600Dx-M

Existing ML684D



1-2 HSLs
4 copper pairs

Single Power
24V/ 48V

6x 100BT ports

2x 1G SFPs

Craft/PFU
1x Craft ports

Up to 10x1G

MACsec Encryption 256bit

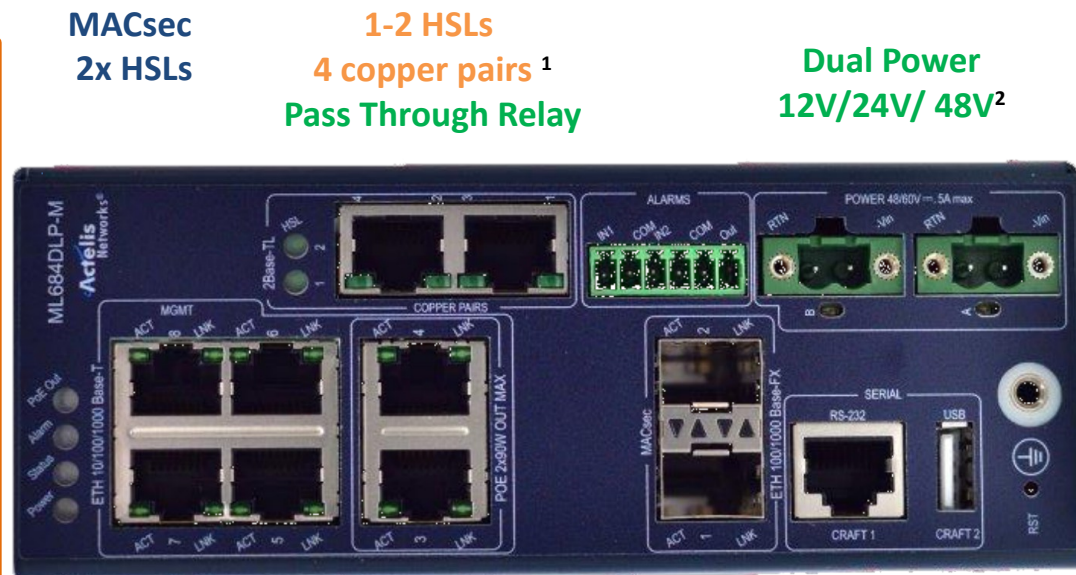
Up to 90W PoE

Power Flexibility

Pass Through

USB

ML684DLP-M - Enhancements are marked Green, Blue



MACsec
2x HSLs

1-2 HSLs
4 copper pairs¹
Pass Through Relay

Dual Power
12V/24V/ 48V²

6x 1G ports + 2x 1G³ (specific models)
2x 1G SFPs
Craft/PFU⁴ Craft *
2x Craft ports

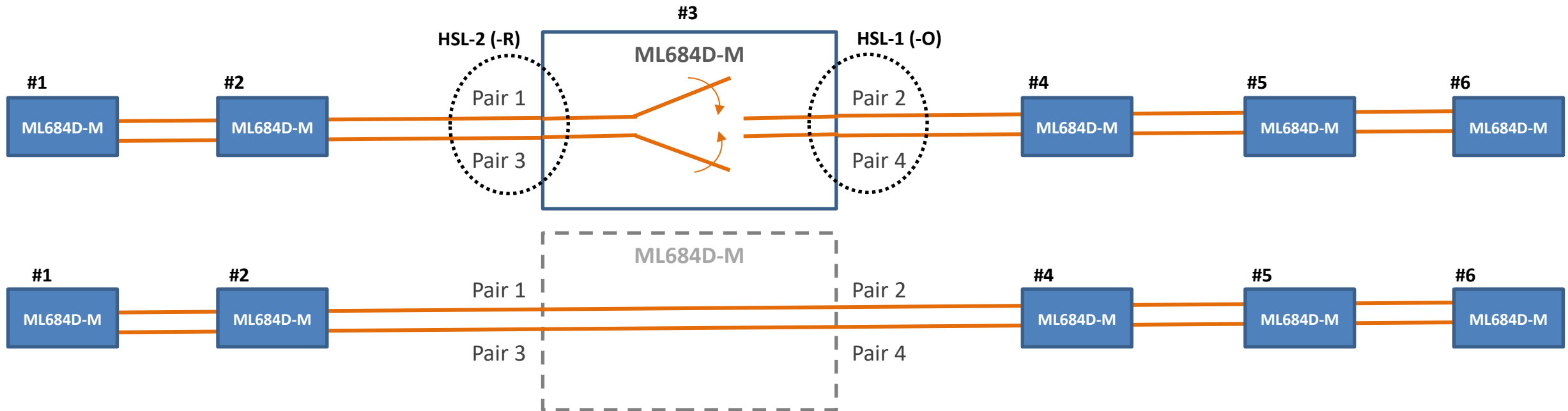
2x PoE 90W
2x MACsec over
Eth ports
(ML684DLx-M)

2x MACsec
over SFP ports
(ML684DLx-M)

1 Applicable for hybrid models – not for fiber only ML680Dx-M
 2 ML684DLP-M & ML680DLP-M offering PoE use 24/48V DC, 5A to support up to 2x 90W PoE
 3 Total of **10x 1G ports** supported by ML680DL-M, ML680DLP-M (MACSec Fiber only units)
 4 Standard craft cable

Service Continuity with Pass Through Relay

The pass-through relay (when enabled) will connect 1 to 3 and 2 to 4. Pass through relay will be enabled in case of power down or no power connected. See diagram below.



Power down in #3 → Relays close → Connectivity restored
Service continues bypassing #3 ML684D-M unit, Connecting directly ML684D-M #2 to #4

Link operate with reduce bandwidth as now the reach is longer. Link would need to recalibrate to reconnect at a lower speed.

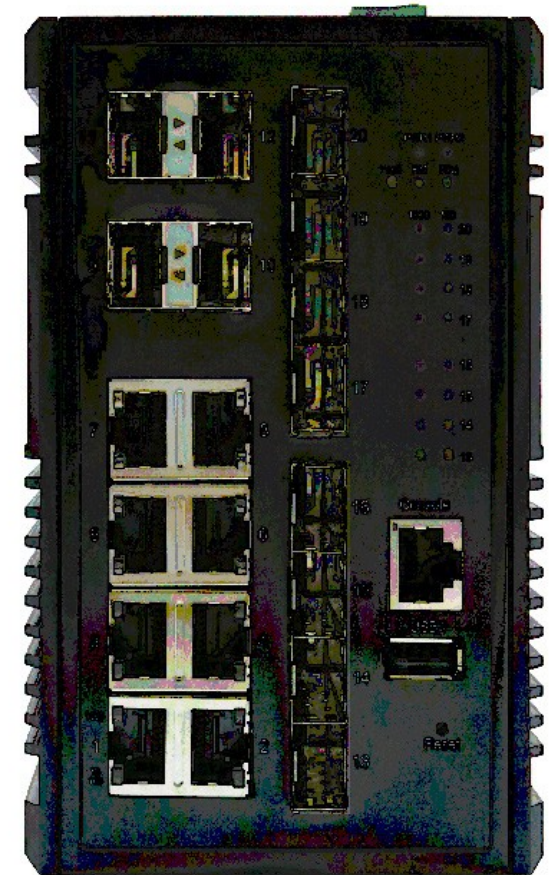
ML5114D

- Compact , Fanless and Environmentally hardened:
 - Operating Temp: -40C to 75C
- DIN Rail mounted
- Very small form factor
 - 154/109/60mm; 6.0/4.3/2.3"
- 12-58 VDC dual power inputs
- POE++ 90 watts on ML5114D**P**
- 14 Ethernet interfaces
 - 10 -10/100/1000BaseT
 - 4 - Fiber 100/1000BaseFX
- Full Layer 2 functionality –
 - 1024 VLANs, Q-in-Q; Jumbo Frames, IGMP v1/v2, QoS, RSTP/STP mesh/ring
- Web GUI & CLI mgmt.



ML570D – High Density Managed 10G Switch – 20 ports

- Industrial Design
 - Harsh environments, wide temperature range compact IP30
- Flexible Network Redundancy
 - RSTP, MSTP, ERPS, LACP
- Advanced Traffic Management
 - QoS- CoS, DSCP, WRR/SPQ Queuing, Storm Protection
- L2 wire speed switching
 - 9K Jumbo frames
- Multicasting - IGMP Snooping
 - v1/v2/v3, up to 512 groups
- Advanced Security
 - IEEE 802.1x, RADIUS & TACACS+
- SNMP v1/v2c/v3
- Easy Deployment / Configuration
 - USB storage, configuration-free replacement
- Industrial automation protocols Ethernet/IP and Modbus TCP
- Superior Reliability and Availability



Broad Fiber Portfolio

- **Various Density – # OF PORTS**

- > 24 ports

- GL6010 Series
- GL6020 Series
- GL6030 Series
- GL6040 Series

- 16-20 Ports

- GL5060 Series
- GL5070 Series

- 10-12-14 ports

- GL5010 Series
- GL5030 Series
- GL5070 Series

- + ML51D/P Series
- + ML540M
- + GL800 Series
- + ML680DL-M, ML680DLP-M Series

- <10 ports

- + ML680DF, ML680D-M Series
- + ML560M
- + ML540E
- + (H) ML640E, ML690E, Series
- + (H) ML684Dx Series

- **10G L2 Switches**

- GL5020 (X) Series
- GL5030 (X) Series
- GL5060 (X) Series
- GL5070 (X) Series
- GL5080 (X) Series
- GL6010 (X) Series
- GL6030 (X) Series
- GL6040 Series
- + ML560M

- **PoE Switches**

- GL5020X Series – PoE+/PoE++ (90W)
- GL5030X Series – PoE+/PoE++ (60W)
- GL5060X Series – PoE+
- GL6010X Series – PoE+
- GL6030X Series – PoE+
- + ML5114DP – PoE+/PoE++ (60W)
- + ML680DFTP – PoE+/PoE++ (60W)
- + ML680DLP-M – PoE+/PoE++ (90W)
- + (H) ML684DFTP – PoE+/PoE++ (60W)
- + (H) ML684DLP-M – PoE+/PoE++ (90W)

- **L3 Switches**

inc. Static Routing, RIP v1/v2, OSPF v2, VRRP v2

- GL5030 (XR) Series
- GL5060 (XR) Series
- GL5070 (XR) Series (ML570D)
- GL5080 (XR) Series
- GL6010 (XR) Series
- GL6040 (XR) Series

- **DIN RAIL Switches**

- GL5010 Series
- GL5020 Series
- GL5030 Series
- GL5060
- GL5070
- GL5080
- + ML51D/P Series
- + ML680Dx, ML680Dx-M Series
- + ML684Dx, ML684D-M Series

- **19" Rackmount units**

- GL6010 Series
- GL6020 Series
- GL6030 Series
- GL6040
- + GL800 Series
- + ML560M
- + ML540M
- + ML540E
- + (H) ML640E, ML690E, Series

DIN Rail Fiber Product Features – GL5000 L2 & L3

Actelis PN	Final Actelis Name		L2/L3	Total	1G RJ-45	1G SFP	COMBO	10G SFP	POE 30W	POE 60W	POE 90W	TEMP EXT
506R61252	GL5010-8J2F	DINRAIL	L2	10	8	2			--	--	--	Y
506R61253	GL5010-8J4F	DINRAIL	L2	12	8	4			--	--	--	Y
506R61254	GL5010-10J2F	DINRAIL	L2	12	10	2			--	--	--	Y
506R61255	GL5020-8J4F-P	DINRAIL	L2	12	8	4			4	--	2	Y
506R61256	GL5020X-8J4F-P	DINRAIL	L2	12	8			4	4	--	2	Y
506R61257	GL5030X-8J4F	DINRAIL	L2	12	8			4	--	--	--	Y
506R61258	GL5030X-8J4F-P	DINRAIL	L2	12	8			4	8	--	--	Y
506R61259	GL5030XR-8J4F	DINRAIL	L3	12	8			4	--	--	--	Y
506R61260	GL5030XR-8J4F-P	DINRAIL	L3	12	8			4	8	--	--	Y
506R61261	GL5030X-8J4F-P1	DINRAIL	L2	12	8			4	4	2	--	Y
506R61262	GL5030X-8J4F-P2	DINRAIL	L2	12	8			4	--	4	--	Y
506R61XXX	GL5070X-8J2F		L2	10	8			2	--	--	--	Y
506R61XXX	GL5070X-8J4F		L2	12	8			4	--	--	--	Y
506R61XXX	GL5070X-8J12F	DINRAIL	L2	20	8	8		4	--	--	--	Y
506R61XXX	GL5070XR-8J2F		L3	10	8			2	--	--	--	Y
506R61263	GL5070XR-8J4F		L3	12	8			4	--	--	--	Y
506R61XXX	GL5070XR-8J12F	DINRAIL	L3	20	8	8		4	--	--	--	Y
506R61264	GL5060X-16J4F	DINRAIL	L2	20	16			4	--	--	--	Y
506R61265	GL5060X-16J4F-P	DINRAIL	L2	20	16			4	16	--	--	Y
506R61267	GL5060XR-16J4F	DINRAIL	L3	20	16			4	--	--	--	Y
506R61268	GL5060XR-16J4F-P	DINRAIL	L3	20	16			4	16	--	--	Y
506R61270	GL5080XR-4J12F	DINRAIL	L3	16	4			12				Y

Rack Mount Fiber Product Features – GL6000 L2 & L3

Actelis PN	Final Actelis Name		L2/L3	Total	1G RJ-45	1G SFP	COMBO	10G SFP	POE 30W	POE 60W	POE 90W	TEMP EXT
506R61271	GL6010X-24J4F-P-DC	Rack	L2	28	24			4	24	--	--	Y
506R61272	GL6010X-24J4F-P-AC	Rack	L2	28	24			4	24	--	--	Y
506R61273	GL6010X-24J4F-P-AD	Rack	L2	28	24			4	24	--	--	Y
506R61274	GL6010XR-24J4F-P-DC	Rack	L3	28	24			4	24	--	--	Y
506R61275	GL6010XR-24J4F-P-AC	Rack	L3	28	24			4	24	--	--	Y
506R61276	GL6010XR-24J4F-P-AD	Rack	L3	28	24			4	24	--	--	Y
506R61280	GL6031-16J12FC-DC	Rack	L2	28	16	4	8		--	--	--	Y
506R61281	GL6031-16J12FC-AC	Rack	L2	28	16	4	8		--	--	--	Y
506R61282	GL6031-16J12FC-AD	Rack	L2	28	16	4	8		--	--	--	Y
506R61283	GL6030-24J4F-P-DC	Rack	L2	28	24	4			24	--	--	Y
506R61284	GL6030-24J4F-P-AC	Rack	L2	28	24	4			24	--	--	Y
506R61285	GL6030-24J4F-P-AD	Rack	L2	28	24	4			24	--	--	Y
506R61286	GL6030X-24J4F-DC	Rack	L2	28	24			4	--	--	--	Y
506R61287	GL6030X-24J4F-AC	Rack	L2	28	24			4	--	--	--	Y
506R61288	GL6030X-24J4F-AD	Rack	L2	28	24			4	--	--	--	Y
506R61289	GL6040X-8J28F-DC	Rack	L2	36	8	24		4	--	--	--	Y
506R61290	GL6040X-8J28F-AC	Rack	L2	36	8	24		4	--	--	--	Y
506R61291	GL6040X-8J28F-AD	Rack	L2	36	8	24		4	--	--	--	Y
506R61292	GL6040XR-8J28F-DC	Rack	L3	36	8	24		4	--	--	--	Y
506R61293	GL6040XR-8J28F-AC	Rack	L3	36	8	24		4	--	--	--	Y
506R61294	GL6040XR-8J28F-AD	Rack	L3	36	8	24		4	--	--	--	Y

MetaASSIST™

The ML Management System

- JAVA based Application
 - Intuitive Graphical User Interface (GUI)
 - Simplifies the:
 - Operation
 - Administration
 - Maintenance
 - Provisioning
- } (OAM&P)
- Runs on Windows systems
 - Connects to MetaLIGHT locally (craft) or remotely (IP)
 - **TDR in every Copper System, Feeds Actelis EMS**
 - **Installation in 30 Minutes**
 - **Actelis Support 7x 24**
 - **> Budgeting : Get a Quote !**

MetaASSIST - Connected to CO - MetaLIGHT_CO (10.2.9.34) and RT - MetaLIGHT_RT

Session View Tools Help

MetaLIGHT System

Back Forward

- MetaLIGHT System
 - CO Node - MetaLIGHT_CO
 - RT Node - MetaLIGHT_RT

CO Node **High Speed Link** **RT Node**

CO - MetaLIGHT_CO

Model: MetaLIGHT-100E
SW Release: 2.00/47

Alarms: - CR
- MJ
- MN

Session: IP (10.2.9.34)
Login: write (RW)

Cards: 1 SDU, 1 MLU

Modems: 16

Eth. Ports: None

High Speed Link

HSL Status: Up
Calib. Mode: Calibrated
Available BW: 10,000 Kbps
CTC: Off

RT - MetaLIGHT_RT

Model: MetaLIGHT-100E
SW Release: 2.00/47

Alarms: - CR
1 MJ
- MN

Session: Via HSL
Login: write (RW)

Cards: 1 SDU, 1 MLU

Modems: 16

Eth. Ports: None

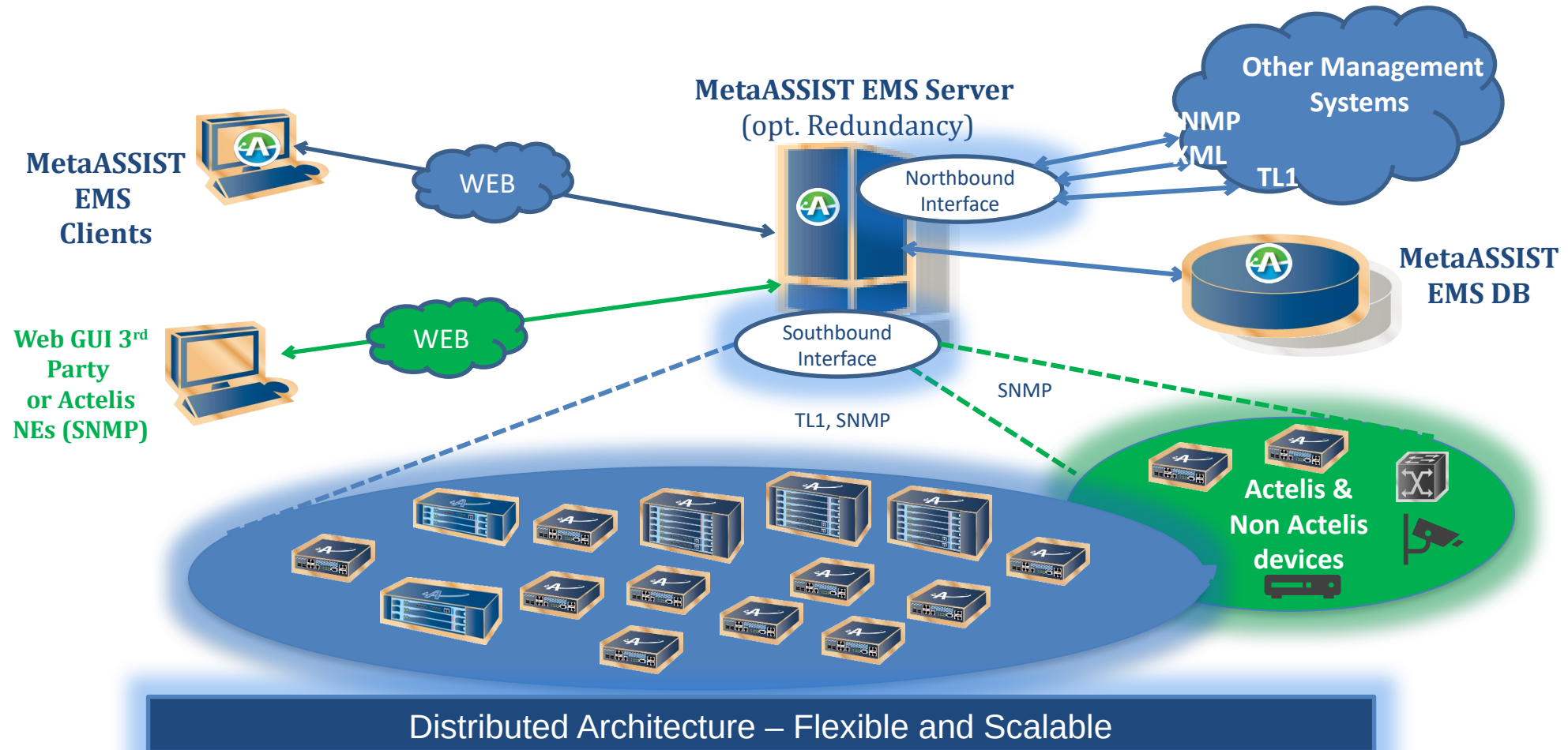
Active Modems: 16
Ethernet BW: 8,000 Kbps

Severity	Condition Type	Node	AID	SA/NSA	Time	Failure Description
MJ	LOS	RT	COLAN	SA	3/30 1:55:38 PM	Loss Of Signal

4/1/2003 10:39:12 AM

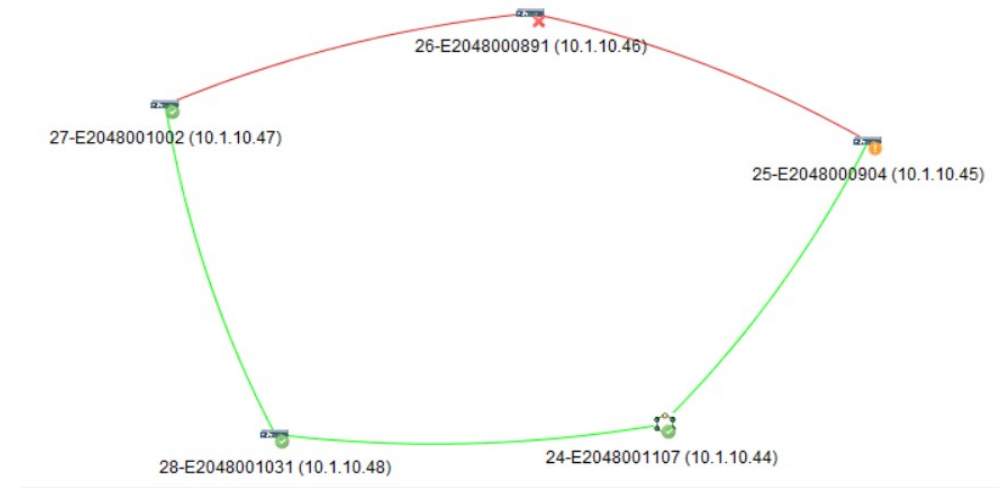
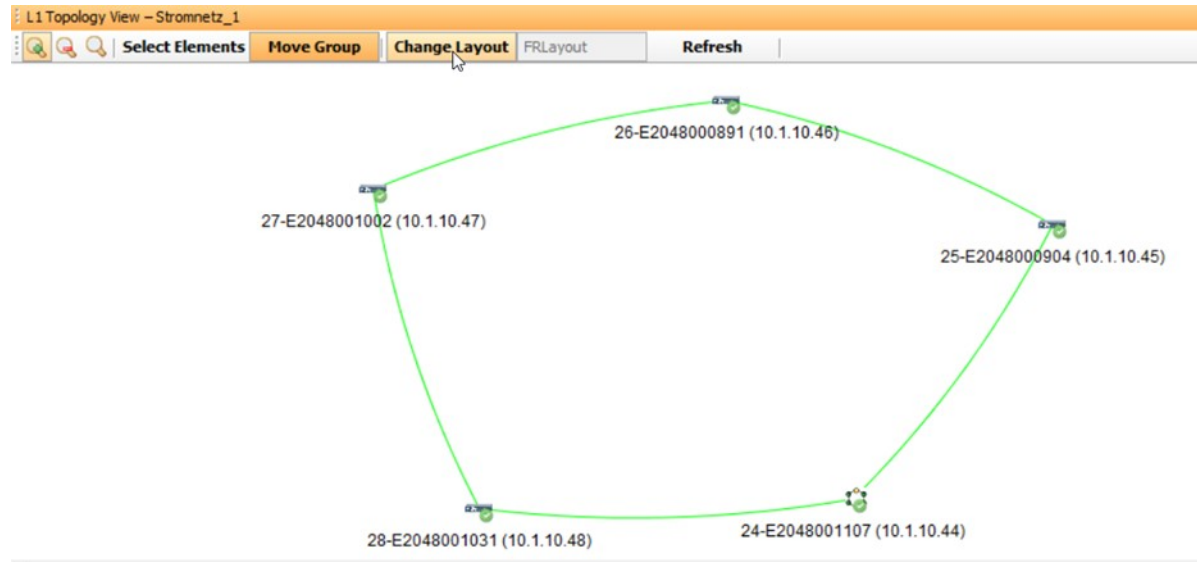
Expanded Network Management Span

One Network Management for all your devices
Actelis NEs and Non Actelis NEs – Camera, Switch, Router



MetaASSIST EMS L1 Topology Feature

NEs show up in Network Tree, Inventory Tab and L1 Topology View



After EMS client is opened -> The NEs are discovered & the setup is presented on the Network Tree, Inventory & L1 topology view

Detailed Alarm/Event View

Detailed Alarm and Event View:

- Alarm Summary per NE/group selection
- Alarm View Customization
- Open MAV from Alarm view per specific NE
- Flexible Filtering
- Comment and Ticket free text
- Export and Printing options

The screenshot shows the Actelis network management interface. The main window displays a table of alarms with columns for Severity, Ack, Description, NE TID (IP), AID, and Name Condition. A 'Details' dialog box is open, showing fields for Seq. No., Time & Date, Time Occurred, Severity (Major), Ack (No), Description (Connection to NE lost), NE TID (IP), AID, Name Condition (NE Disconnected), Type (Communications), Ticket ID, Assignee, and Comment. A 'Choose Columns' dialog box is also open, allowing users to select which columns to display in the table. The 'Alarms Filter' dialog box is visible at the bottom left, showing filters for Seq. ID, Severity (Warning), Ack Status (Un-Acknowledge), Name Condition (SDUNOPROT), Alarm Time, NE TID (IP), and AID.

Effective and immediate alarm handling

E-mail Notifications

- Immediate event notification to maintenance and monitoring team
 - Automated notification to a pre-defined list of E-mails and/or SNMP managers for faster response and problem resolution
 - Configurable recipient list per alarm type for effective alarm management.

The image displays two screenshots of the MetaASSIST EMS 3.0.22.1 interface. The top screenshot shows the 'Administration' tab with 'Events Configuration' and 'Threshold Alarms' sub-tabs. A table lists various events with columns for 'Event', 'Send to SNMP NB Group', and 'Send to Email to Group'. The 'Send to Email to Group' column for the 'AIS' event is highlighted, and a dropdown menu is open showing options like 'Tech', 'Tech _ NOC', and 'Tech_CS_FR'. The bottom screenshot shows the 'Email Groups' tab with an 'SMTP' sub-tab. A table lists email groups with columns for 'Name' and 'Email Addresses'. An 'Add Email(s) Group' dialog box is open in the foreground, showing a 'Name' field with 'Tech2' and an 'Email Addresses' field with 'Tech2@actelis.com'.

Event	Send to SNMP NB Group	Send to Email to Group
HWFLT	NOC	Tech
CPMAJOR		Tech _ NOC
Login Failure		Tech _ NOC
AIS	NOC	Tech _ NOC
LOF		Planning
LOWSNRM		Tech
HSLFLT		Tech _ NOC
CONFMS		Tech_CS_FR
LOWBW	NOC	
RECT		
EMGOPRG		

Name	Email Addresses
Planning	Plan@actelis1.com, michalw@actelis.com
Tech	tech@actelis.com
Tech _ NOC	technoc@actelis.com
Tech_CS_FR	TECHFR@actelis.com

Add Email(s) Group

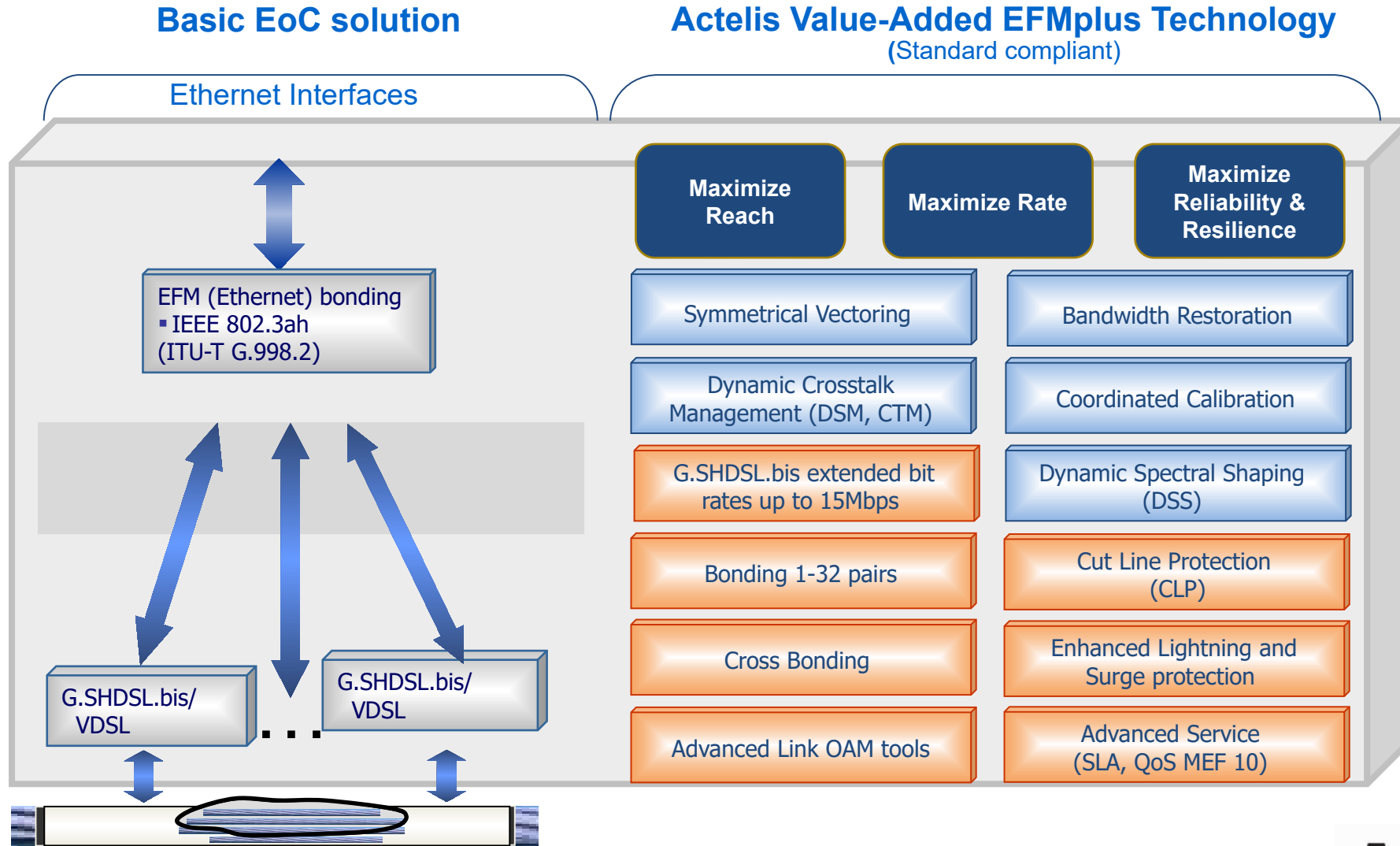
Name: Tech2

Email Addresses (separated by commas): Tech2@actelis.com

OK Cancel

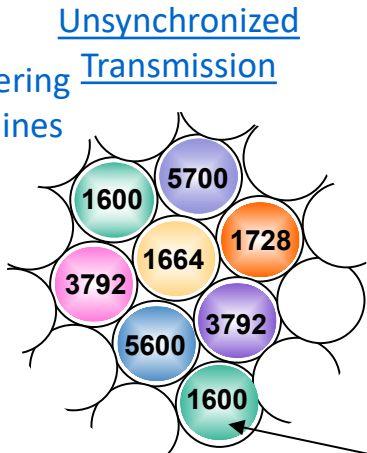
Actelis Algorithms

Delivering Best in Class Rate, Reach, Reliability

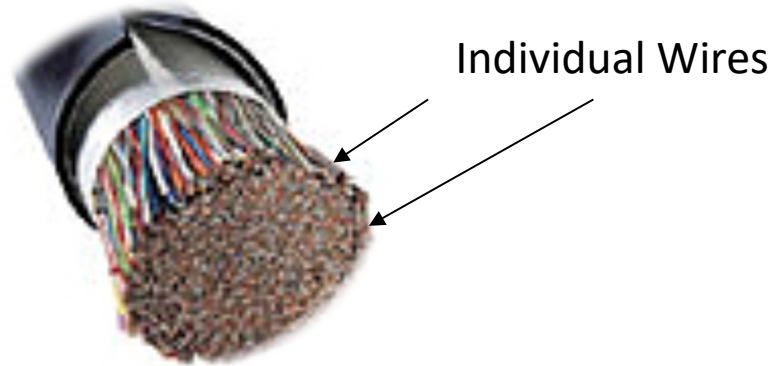
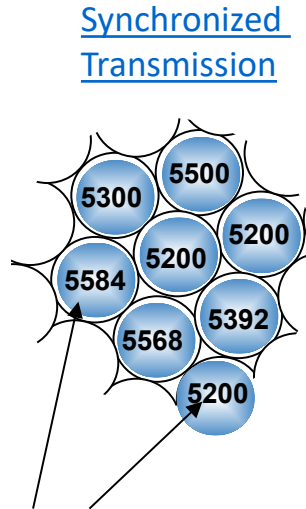


Actelis MetaLIGHT Technology Combines 100X Wire Performance Boost with Triple-Shield Security

- Lines interfering with other lines
- Suboptimal
- Unreliable
- Unsecure



- Lines supporting other lines
- Optimal
- Reliable
- Secure



Copper Cable

- Optimal synchronization of multi-line signals
- Elimination of interference to boost speed
- Data line coding for resilience, security ⁽¹⁾
- Multi-line scrambling for low latency, security ⁽²⁾
- 256-bit encryption of transmission ⁽³⁾
- Fast, multi-line modulation for up to 10Gbps ⁽⁴⁾
- Spectrally compliant reach extenders to 100Km
- Remote powering + precision timing to 4G/5G base stations



(1), (2), (3) – Components of Triple Shield Protection
(4) – 10Gbps available in 2022

Thank You!

BRUCE HAMMERGREN
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