AVARA OMP8805/8810/8816
MULTI-SERVICE ACCESS PLATFORM

The Avara OMP8805/8810/8816 Multi-Service Access Platforms deliver industry-leading MPLS-TP with pseudowire capabilities in compact formats with the ability to cross connect, groom and aggregate multiple services onto 1G and 10G packet transport infrastructure.

The Avara OMP88XX platform has been specifically designed to provide a compact solution for transporting switched Ethernet and E1 circuits over packet based MPLS-TP and IP networks for mission critical, high availability applications.

It is the ideal replacement for migrating existing SDH based networks into contemporary next generation packet networks where predictability in performance is essential.

Built on the Avara DynaFlex product line technology, the OMP88XX shares the market leading feature set of DynaFlex bringing a powerful, service-oriented capability to Utility & Rail networks in a range of form factors relevant for critical networks.

With end-to-end service management under the Avara ASPeCT network management system, the OMP88XX greatly enhances transport solutions using packet technology.

Supporting Legacy Applications with Pseudowires

The OMP platform is well suited to support the transport needs of the evolving Utility, Rail and other critical networks where supporting legacy services such as teleprotection and VF links are fundamental.

It supports a full complement of legacy interfaces including Serial, G.703/64K, FXO/FXS, VF E&M, Local Battery and C37.94 with port densities and form factors to suit critical networks.

The Avara OMP88XX can be effectively deployed in a E1 based multiplexing environments capable of supporting teleprotection, VF and other legacy services together with next generation Ethernet/IP based traffic in a predicatble and deterministic manner.

Pseudowires for Networking

To provide efficient networking, the Avara OMP88XX platform employs pseudowire encapsulation methods to map services end to end.

The pseudowires can be used to support E1, VF, Serial, C37.94 and Ethernet services.

The use of pseudowire technology allows critical services to be deployed over cost-effective, packet switched environments.

The OMP platform supports SAToP (RFC 4553) and CESoP (RFC 5086) to encapsulate and transport TDM traffic at 2Mbps and at Nx64K rates thus efficiently supporting mission critical legacy services seamlessly.

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It supports RFC 4448 (Encapsulation Methods for Transport of Ethernet over MPLS Networks) for carrying Ethernet/IP packets. All traffic from an Ethernet port can be carried over a single pseudowire or over multiple pseudowires based on the ingress VLAN.

MPLS-TP
The OMP88XX platform provides MPLS-TP (Multi-Protocol Label Switching – Transport Profile) compliant interfaces.

MPLS-TP is standardized jointly by the IETF (Internet Engineering Task Force) and the ITU-T (International Telecommunications Union) as the next generation packet transport technology.

MPLS-TP provides similar capabilities and functionality to SDH/SONET that includes static configuration of circuits, synchronisation options, protection switching capabilities, bidirectional LSP's (label switched paths) and PW's (pseudowires), advanced end-to end OAM, QoS and packet switching functionality to meet the current and future needs of next generation mission critical networks for rail, electricity, oil & gas industries.

Key elements include:
- Connection-oriented network realisation with bidirectional label-switched paths ensure symmetry in delay performance
- OAM based fault and performance management

IP NETWORKS
The OMP88XX platform can also transport legacy CESoP and SAToP based services over IP and with or without VLAN tags.

With all services being carried over UDP/IP/Ethernet, logical layer 3 network segmentation can be achieved through IP subnetworks.
Both static and dynamic routing is supported. RIP (V1/V2) and OSPF routing protocols are supported.

Layer 2 network segmentation can be achieved using VLANs

Synchronisation
Accurate synchronization is critical in transport networks to maintain network operational integrity, and the delivery of reliable data services.

The Avara OMP88XX supports a number of timing options that include, external reference timing, line timing, adaptive clock recovery (ACR) timing and synchronous Ethernet. The adaptive clock recovery timing option is fully capable of offering end-to-end synchronization.

In addition, the OMP88XX is hardware-ready to support IEEE1588v2 and provides a on-board Stratum-3 clock source to assist maintain synchronization in the event of loss of a primary timing source.

Quality of service
A critical component when delivering services over a packet network is the ability to provide the end-to-end quality of service capabilities to meet the varied requirements for different traffic types.

Voice and TDM services in particular require low delay and low jitter through the packet network to ensure reliable operation. Whereas IP data services are not so delay sensitive but are sensitive to packet loss that can significantly affect the operation and throughput of the data service.

In OT network applications such as teleprotection, low latency, low jitter and symmetrical delay are essential for proper operation.

To support different traffic QoS requirements the OMP provides a number of service classification, marking, traffic prioritisation and scheduling capabilities that are identified and assigned at the service entry point and marked in-line with the appropriate QoS metrics to ensure reliable delivery for end-to–end services.
Traffic classification, marking and scheduling is carried out based on the following categories:

Service Classification:
- TDM Timeslot/port
- Ethernet port/VLAN
- Ethernet 802.1p/VLAN

Traffic Scheduling:
- weighted round robin
- strict priority
- profiled.

Operations, administration and maintenance (OAM)
The OMP88XX provides operations, administration and maintenance (OAM) features to monitor and diagnose services including:

- LSP ping
- Delay Measurement
- Loss Measurement

Performance Monitoring runs in the background, periodically collecting service information from multiple mechanisms and monitoring for problems.

These features, when under the control of the Avara ASPeCT management system, ensures rapid fault detection and alarm correlation for efficient troubleshooting.

In particular, service performance can be proactively monitored by ASPeCT.

This powerful capability allows the specification of performance criteria which can then be compared to actual performance data in the network. Any transgressions detected are automatically reported by ASPeCT to the Network Operations Centre (NOC).

OMP88XX Platform

Features & Benefits

Cost effective migration from SDH-based connectivity to Ethernet networking using IP routing and MPLS-TP based label switching greatly reducing operating expenditure.
Fan-less operation and compliance to IEC-61850-3, IEEE-1613 & EN50121-4 ensure fit for use in harsh operating environments.
Resiliency & redundancy features supported by the product architecture, such as dual power supplies and multiple controller & trunk units, lead to improved connectivity uptime allowing critical services to be deployed safely.
Service aware capabilities provided by Avara's ASPeCT NMS ensures rapid fault detection and provides commissioning and trouble-shooting features.
Uplink speeds of 1Gbps, 10Gbps and 40Gbps (future) ensure network scalability as higher capacity services are introduced into the operational network.
Long product life cycle ensures investment protection.
Modular product architecture provides network deployment flexibility.
Multiple synchronisation options ensure TDM service support without data loss for suitability to support critical services such as tele-protection

OMP8805/OMP8810 Platform Family Chassis & Characteristics

Scalability & Density
The OMP88XX platform is available in 3 form factors:

OMP8805
- 5-slot version supporting a variety of interface modules.
- Single controller & trunk unit with 1G/10G uplinks.
- Three slots available for interface cards and one slot always used for power.

OMP8810
- 10-slot version supporting a variety of interface modules.
- Supports up to two controller & trunk units with 1G/ 10G uplinks.
- Seven slots available for interface cards and one slot always used for power.

OMP8816
- 16-slot version supporting a variety of interface modules.
- Supports up to two controller & trunk units with 1G/10G uplinks.
- Ten slots available for interface cards and two slots available for power.
- Higher port count interface cards to create big nodes

Service Grooming
The OMP also provides a mechanism for terminating multiple CESoP services

and grooming them onto channelised E1 interfaces through a sophisticated cross connect capability. This feature allows support for both voice and data summing allowing a complete solution for critical networks.

Industrial Networks
The OMP platform is designed for Utility, railway and other heavy industrial applications. As such, it has been designed to meet demanding environmental standards such as IEC 61850-3, IEEE 1613 & EN50121-4.

Delay Sensitive Applications
With gauranteed symmetrical delay performance and symmetric switching performance, the OMP platform is ready to support critical applications such as tele-protection ensuring that connected relays do not trip inadvertently.

Security
The OMP platform uses industry accepted technology such as SSHv2, Secure Copy and SNMPv3 as standard protocols. Control plane security is assured through the use of dedicated VLANs and IPSec (future). Resilience to data plane attacks is ensured by

encapsulating user traffic into pseudowires and tunnels restricting access to only the end points of the pre-configured path through the network whilst management plane attacks are prevented through the use of easy to use firewalls.

Low Power Consumption
Using the latest available technology, the OMP platform represents unparalleled low operating power consumption resulting in a much lower operating cost. Additionally. the lower power dissipation means that the operating temperature is lower thus increasing reliability and field longevity.

Service Visibility
With full FCAPS functionality, the ASPeCT NMS gives users the visibility and flexibility to confidently provision end-to-end services without adversely affecting existing services. Full audit trail capabilities enable organisations to implement comprehensive security policies.

SW Tamper Resilience
Software upgrades provided are digitally signed using asymmetric keys ensuring that tampered SW cannot loaded onto the NE.

OMP8805/OMP8810 Platform

Avara OMP8805

Avara OMP8810

	OMP 8805		OMP 8810
Order Code	P31000.01		P31000.02
Mechanical Height Depth Width	51 mm 220 mm 440 mm		102 mm 220 mm 440 mm
Redundancy & **Resiliency**	Power Feeds Hot Pluggable Units Synchronisation Sub 50ms Protection Switching		Power Feeds Hot Pluggable Units Synchronisation Sub 50ms Protection Switching Dual Controller & Trunk/Switch Fabric
Trunk Units P31020.03 P31020.04 P31020.11	**CTM-48** 4x10G, 8x1G Trunk Ports 4x10/100/1000Base-T Trib Ports Sync-In & Sync-Out **CTM-8** 8x1G Trunk Ports 4x10/100/1000Base-T Trib Ports Sync-In & Sync-Out **CTM-148** 1x40G, 4x10G, 8x1G Trunk Ports 4x10/100/1000Base-T Trib Ports Sync-In & Sync-Out	**Tributary Units** P31030.01 P31030.02 P31040.01 P31041.01 P31051.01 P31051.02	**4 x E1 G.703/G.704** 75Ω/120Ω Balanced **8 x E1 G.703/G.704** 120Ω Balanced **4 x 10/100/1000Base-T** Connector: RJ45 **4 x 1000Base-X** Connector: SFP **4 x VF E&M** 600Ω Impedance **2 x VF E&M + LB** 600Ω Impedance
Power Interface **Units** P31010.01	**DC-PIU + ALARMS** 20 to 72VDC Operation 3 x Dry Contact Alarm Outputs Reverse Polarity, Over Current & Transient Voltage Protection	P31052.01 P31053.01 P31060.01 P31061.01 P31061.02 P31063.01	**4 x FXO** 600Ω Impedance **4 x FXS** Configurable Impedance **4 x G.703/64K** Co/Contra Directional Timing **4 x V.24/V.28 Serial Data** Sync/Asyn, 0 .. 64kbps **2 x X.21 Serial Data** Sync, N x 64kbps **2 x C37.94 Teleprotection** N x 64kbps (N = 1 .. 12)
Environmental Temperature Relative Humidity Cooling	-20 °C to +65 °C 5-90% (Non-condensing) Natural Convection (fan-less)		
Power Operating Range Max Consumption	20VDC to 72VDC 50W		20VDC to 72VDC 100W

OMP8816 Platform

	OMP 8816		
Order Code	P31000.03		
Mechanical Height Depth Width	325 mm 224 mm 445 mm		
Redundancy & Resiliency	Power Feeds Hot Pluggable Units Synchronisation Sub 50ms Protection Switching Dual Controller & Trunk/Switch Fabric		
Trunk Units P31020.03	**CTM-48** 4x10G, 8x1G Trunk Ports 4x10/100/1000Base-T Trib Ports Sync-In & Sync-Out	**Tributary Units** P31114.01	**8 x E1 G.703/G.704** 75Ω/120Ω Balanced
P31020.04	**CTM-8** 8x1G Trunk Ports 4x10/100/1000Base-T Trib Ports Sync-In & Sync-Out	P31115.01 P31115.02	**8 x 10/100/1000Base-T** Connector: RJ45 **6 x 1000Base-X** Connector: SFP
P31020.11	**CTM-148** 1x40G, 4x10G, 8x1G Trunk Ports 4x10/100/1000Base-T Trib Ports Sync-In & Sync-Out	P31121.01 P31122.01	**8 x VF E&M + LB** 600Ω Impedance **8 x FXO** 600Ω Impedance
		P31123.02	**8 x FXS** Configurable Impedance
Power Interface Units P61005.01	**DC-PIU + ALARMS** 20 to 72VDC Operation Dual Power Feed Inputs 3 x Dry Contact Alarm Outputs Reverse Polarity, Over Current & Transient Voltage Protection	P31133.01 P31131.01	**8 x G.703/64K** Co/Contra Directional Timing **8 x V.24/V.28 Serial Data** Sync/Asyn, 0 .. 64kbps
P61006.01	**AC-PIU + ALARMS** 90 to 260VAC Operation 3 x Dry Contact Alarm Outputs Reverse Polarity, Over Current & Transient Voltage Protection	P31132.01 P31134.01	**4 x X.21/V.36/RS449 Serial Data** Sync, N x 64kbps **4 x C37.94 Teleprotection** N x 64kbps (N = 1 .. 12)
Environmental Temperature Relative Humidity Cooling	-20 °C to +65 °C 5-90% (Non-condensing) Natural Convection (fan-less)		
Power Operating Range Max Consumption	20VDC to 72VDC 90 to 260VAC 200W		

Features & Specifications

CRITICAL NETWORKS DESIGN PARAMETERS	LEGACY INTERFACE TYPES
Fanless Operation Extended temaperature range: -20° to +65°C Copper, Dual Fibre & Single Fibre Optical Connectivity Alarm Contacts for local forwarding Fully complement of legacy interfaces Full range of Ethernet interfaces Hot pluggable Controller/Trunk Cards Hot pluggable Interface Cards Hot pluggable Power Supply Units Dual controller/trunk operation for high availability networks	E1 (G.703/2M) FXS FXO VF 2/4-Wire E&M G.703/64K V.24/V.28 C37.94 X.21/V.36/RS449

MANAGEMENT & SECURITY	ETHERNET INTERFACE TYPES
Management port on each Controller/Trunk unit SNMP v1/v2/v3 SSHv2 TLS 1.2 Hashing: SHA-256/SHA-512 Relay outputs for local alarm forwarding End to end service provisioning via ASPeCT NMS Fully featured graphical Local Craft Terminal (LCT) North Bound Interface (via SNMP)	10/100/1000Base-T 1000Base-X (SFP) 10Base-X (SFP+)
	SUPERVISORY SUBSTATION UNIT TTL Digital Inputs Analogue Inputs (+/-80v range) Solid State Relay Outputs

LAYER 3 ROUTING	LAYER 2 INTERFACES	
Static Routing OSPF, RIP v1/v2 Multiple Routing Tables	Speed Autonegotiation Duplex MDI/MDIX Support	10/100/1000Base-T 1000Base-X (SFP) Yes (RJ45 only) Full/Half (RJ45 only) Yes (RJ45 only)

OPERATIONS & ADMINISTRATION (OAM)	NODE SYNCHRONISATION
Y.1731 based performance monitoring Delay Measurement Loss Measurement	Sync-In (2MHz & 2Mbps) Sync-E IEEE 1588v2 (Future) Avara Timing Distribution Protocol

MPLS-TP SERVICE TYPES	HARDWARE REDUNDANCY
E-LINE Point to point service (VPWS) E-LAN Multipoint (VPLS) 1+1 Pseudo Wire Service Protection	Dual Controller/Trunk Cards Dual Power Supply cards

SWITCHING FABRIC	INDICATORS
Non-blocking 120Gbps Large Forwarding Database for MAC entries MTU 9K (Jumbo Frames) Single/Two Rate 3-Color Ingress/Egress Policing 4 Priority Queues per Physical Port	Status LEDs on Power Interface Units Status LEDS on all Channel Interface Units Status LEDs on Controller/Trunk Units
	LOOPBACKS Line Loop (towards interface): Yes Equipment Loop (towards network): Yes Loopback release timer: Yes

TIME SYNCHRONISATION	ENCLOSURE
NTP SNTP	Ingress Protection Rating: IP40

Standards & Protocols

IEEE	ITU-T
IEEE 802.3 Ethernet IEEE 802.1d STP IEEE 802.1x IEEE 802.3u Fast Ethernet IEEE 802.1p VLAN Tagging IEEE 802.1q Priority Queuing IEEE 802.3x Flow Control	ITU-T G.823 ITU-T G.711/G.712 ITU-T Q.552 ITU-T G.8031 ITU-T G.8032 ITU-T G.8271

ENVIRONMENTAL	MPLS-TP
EN55022 Class A Emissions EN55024 Immunity EN50082-2 Generic Immunity ETS 300 019-1 Environment ETS 300 019-1-1 Storage ETS 300 019-1-2 Operational ETS 300 019-1-3 Transport EN 61000-4-2: Electrostatic Discharge EN 61000-4-3: Radiated, radio-frequency, electromagnetic field immunity test EN 61000-4-4: Electrical fast transients EN 61000-4-5: Surge immunity test EN 61000-4-6: Immunity to conducted disturbances, induced by radio-frequency fields IEC61850-03: Communication networks & systems for power utility automation IEEE 1613: Environmental and Testing Requirements for Communications Networking Devices Installed in Electric Power Substations	RFC5921: MPLS Transport RFC6378: MPLS-TP Linear Prot RFC5654: Requirements of a MPLS Transport Profile RFC5462: Multiprotocol Label Switching (MPLS) RFC5586: MPLS Generic Associated Channel RFC5860: requirements for MPLS-TP RFC5718: an in-band communication channel RFC5950: network management for MPLS-TP RFC5951: network management requirements for MPLS-based transport networks RFC6372: MPLS-TP Survivability Framework RFC6426: On demand connectivity verification RFC6428: Proactive connectivity verification

SAFETY	MANAGEMENT	SECURITY
EN60950 Safety 41003 Laser Safety	RFC1157 SNMP RFC1213 MIB II RFC854 Telnet RFC783 TFTP	RFC2865: RADIUS TACACS+ SYSLOG SSHv2 SNMP V3 SFTP & Secure Copy

IETF	CIPHERS	MACs
RFC 5086: CESoP RFC 4553: SAToP RFC 4448: Ethernet over MPLS Networks	AES-128 AES-196 AES-256	SHA2-256 SHA2-512 **RSA** Key Size: 2048

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