

## ZEUGMA SERVICES NODE

### HIGHLIGHTS

- **Open Application Sandbox:**  
New applications can be provisioned into the Zeugma Open Application Sandbox where their diverse behavior is safely executed. Initial applications include VOIP and Video QOE, service-specific bandwidth on demand, and URL filtering.
- **Multi-Service Edge:**  
Integrated routing, subscriber and application management delivered in a chassis-based system with aggregate throughput of 720 Gbps.
- **Hybrid Architecture:**  
The introduction of the extensible compute grid with up to 520,000 DMIPS of processing capacity in combination with a non-stop forwarding plane makes possible a new class of applications at the network edge.
- **Bandwidth Management:**  
Integrated real-time resource management, subscriber-specific on-demand bandwidth and QOS, and per-flow CAC functions.
- **Carrier Grade:**  
NEBS compliant, in-service upgradeable, fully redundant, high availability system for deployment in carrier networks around the world.
- **Statistics Collection:**  
Leveraging the compute grid, the ZSN can collect flow statistics on all subscribers and their services; additional reporting is available through Zeugma OSS.



The Zeugma Services Node (ZSN) is the first Service Delivery Router (SDR) to provide an Open Application Sandbox on a carrier grade routing and subscriber management edge device. This unique combination of capabilities enables broadband service providers to deliver new revenue-generating services with minimal complexity and dramatically reduced cost.

The Zeugma Services Node provides the control, delivery and accounting of services at the network edge. In recognition of the key role it plays as a single interaction and control point, the ZSN has been architected from the ground up to cater to the most stringent demands of the largest carriers around the world.

Unique to the ZSN is its extensible compute grid that ensures applications can scale as service adoption and subscriber growth continues. Operationally, compute grid resources seamlessly expand and contract as Compute Blades are added or removed from the system. The compute grid forms the scalable resource required to enable the complementary third dimension of a network element, the service control plane. No other system can scale to meet the growing demands of today's emerging services.

The combination of an advanced forwarding plane along with an innovative service control plane brings new capabilities not found in typical network equipment. The fundamental notion of a subscriber application session is only possible through the combination of flow-based classification, deep session inspection, and extensible service logic. Sessions are not just composed of a flow; they can consist of a number of diverse protocols and transactions.

Diverse application service logic is managed by the ZSN through the Zeugma Open Application Sandbox (OAS). This protected environment enables new behavior to be deployed into the network in internet development timeframes, as opposed to traditional carrier upgrade cycles. As new revenue opportunities present themselves, a service provider can rapidly deploy an appropriate application to participate in emerging revenue.

The Zeugma Services Node is a Service Delivery Router that can be tailored to meet the needs of today's multi-service network deployments. Needs that can be driven by internally defined applications such as IPTV, as well as revenue generating applications that are being delivered Over-The-Top.



## HARDWARE

### Chassis

- 22.5" (H) x 19.0" (W), 15.5" (D)
- 13 RU chassis, 3 chassis per 7' rack
- 19" or 23" rack mountable
- 14 slots, minimum two for Compute Blades, up to 12 slots for Traffic Blades
- Cooling: bottom front to top rear
- Interface capacity up to 720 Gbps (unidirectional)

### Compute Blade

- 1+1 OAMP redundancy and 1:n subscriber redundancy
- 4 GB memory upgradeable to 16 GB
- Compact Flash storage
- Ethernet 10/100/1000 BaseT management port
- Fully meshed backplane: all Compute Blades are concurrently addressable

### Traffic Blades

- 10 Gbps line rate forwarding with deep packet inspection
- 14M packets per second throughput
- Flow metering, marking, policing, and shaping, WRED, priority or WFQ hierarchical scheduling
- 64K queues, 500K managed flows per slot
- 10-port Gigabit Ethernet based on SFP hot pluggable optics: SX/LX/ZX
- 1-port 10 Gigabit Ethernet based on XFP hot pluggable optics: SR/LR
- 6-port 10 Gigabit Ethernet based on XFP hot pluggable optics: SR/LR
- Fully meshed backplane: all Traffic Blades are concurrently addressable

### High Availability and Redundancy

- 1+1 shelf manager, 1+1 OAMP, 1:N subscriber management process & graceful protocol restart
- Hot-swappable Compute and Traffic Blades
- Redundant fans and power modules

### Operating Environment

- Power: 3200 watt (max), -48VDC
- Operating temperature: 5-40C
- Humidity: 5%-85% non-condensing
- NEBS Level III, SR-3580, GR-63 Core, GR-1089 Core, ANSI/UL 60950-1-2002, CAN/CSA C22.2 No 60950-1-0, CE Mark, ETSI EN 300 019, ETSI EN 300 386, FCC Part 15 Class A, ICES-003 Class A

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## SOFTWARE

### Architectural Features

- Distributed compute grid coupled with Zeugma Application Sandbox enable scalable and extensible service applications. True plug and play environment for delivering services

### Subscriber Management

- RADIUS authentication, authorization, and accounting (AAA), dynamic circuit binding, policy definition and application registry
- Dynamic / static IP Subscriber Sessions (ISS), DHCP relay, proxy and server
- PPPoE Subscriber Sessions
- PPP over L2TP

### Protocol and Encapsulation Support

- Routing: OSPF v2 (RFC-2328), IS-IS (RFC 1195) ECMP (RFC-2991, 2992)
- L2TPv2-LNS (RFC 2661)
- Multicast: IGMPv3 (RFC 3376) , PIM-SM (SSM)
- Ethernet: IEEE 802.1q VLAN
- Session protocols: SIP (RFC-3261), RTSP (RFC-2326), RTCP (RFC-), RTCP-XR (RFC-3611), RTSP-HR (draft-ietf-avt-rtcphr-00), TI PIQUA

### Traffic Management

- 802.1p class of service (COS), Differentiated Services Code Point (DSCP) TOS, and application driven queuing
- Packet classification (RFC-2474, 2575, 2597, 2598); DiffServ packet marking by ACL, hierarchical ingress policing and egress shaping; DSL Forum's TR-092 and TR-059 compliant hierarchical scheduler
- Bandwidth manager enables per subscriber, per application, on-demand bandwidth and QOS queue resource allocation

### Statistics Collection

- Equipment, port, framing, routing, and flow statistics (RFC-1213, 1471, 2011, 2021, 2819, 2863, 2933, 3635, 3954, 3917, draft-ietf-magma-mgmd-mib-08, draft-ietf-ipfix-protocol-19, draft-dressler-ipfix-aggregation-02, DSL Forum TR-092, TR-101)
- Per subscriber, per flow statistics

collection reported on 15 minute intervals with TCA support

### Management Interfaces

- Command line interface (CLI) support via SSH/Telnet
- Service oriented architecture (SOA) support inspired by industry standard XML interfaces (WS-\*, MTOSI, etc.)
- Secure user authentication and privilege level based authorization for both CLI and SOA (XML)
- Linux based Oracle database for multi-node provisioning and analytical processing
- Linux based J2EE application server for multi-node Operations System Support (Zeugma OSS)
- GUI support for OAMP, statistics, application, and service management

## SANDBOX APPLICATIONS

### QOE Monitor

- Quality of experience analysis for video on demand and voice over IP
- MOS calculation with TCAs

### Application Driven Bandwidth

- Detection of control signalling for video on demand and voice over IP
- Dynamic queue assignment
- Dynamic shaper adjustment

### URL Filtering

- Per subscriber URL filtering
- Black-list redirect