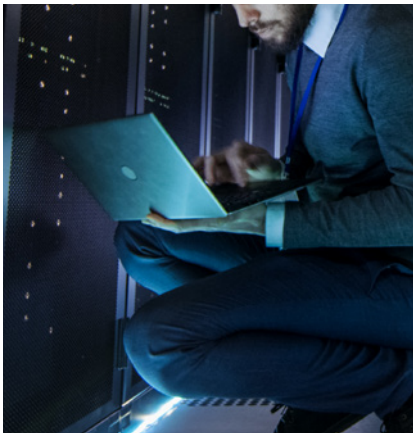


PacketLogic™ 1000 Series Platforms

Sandvine's platforms are based on reliable, industry standard server and storage hardware architecture

KEY CAPABILITIES

Sandvine's PacketLogic 1000 series supports a full suite of network intelligence functions, including:

- Scalable and granular statistics and KPI storage
- Large scale subscriber management
- High volume policy control and rules function deployments
- Multi-access network intelligence visualization through the Insights product family

The PacketLogic 1000 series serves as the Active Network Intelligence (ANI) platform for Insights Data Storage and Maestro Policy Engine.

The latest PL1000 series is the PL1800 family, consisting of high-end storage and server platforms that offer carrier-grade reliability and availability. Its flexibility ensures that it can be configured to address specific network requirements based on the role it needs to play in the deployment.

For small and mid-level environments, the PL1840 platform is based on an industry-standard, highly reliable server and storage hardware architecture, with the PL1860 serving as higher-end platforms. PL1800 (control node) platforms interoperate with Sandvine's hyperscale data plane – ActiveLogic – and can connect to multiple ActiveLogic instances from a single PL1800 node.

Multiple storage nodes can be connected to each control node, including Sandvine's control plane element Maestro Policy Engine, enabling carrier-class scalability for data collection.

PL1800 running Sandvine Maestro acts as the single point of contact for external policy management systems (i.e., PCRF and BSS/OSS) as well as ActiveLogic. With support for millions of subscribers per platform, the Policy Engine enables large-scale subscriber deployments. Multiple Maestro instances can be deployed together for scaling to hundreds of millions of users to support the largest networks in the world.

The PL1881 platform is specifically for Sandvine's Insights Data Storage – for large scale deployments. It acts as an intermediary node between Maestro Policy Engine and ActiveLogic, which completes the deployment. ThePL1881 can connect to multiple ActiveLogic instances from a single platform.

KEY USE CASES

The PL1800 series supports Sandvine's Active Network Intelligence use case, including:

- Performance and Operational Monitoring
- Service and Subscriber Monitoring
- Performance Analysis
- Capacity Planning Analysis
- User Behavior and Demographic Analysis
- Usage-Based Services
- Zero-Rating and Application-Based Plans
- Parental Control

POWERFUL POLICY ENFORCEMENT CAPABILITIES

The PL1800 platforms are turnkey hardware solutions optimized to support Sandvine's ANI software, delivering the network intelligence, and industry-leading contextual awareness required for running and optimizing next generation networks.

Insights Data Storage Key Features:

- • Carrier-class storage for hundreds of millions of statistics items
- High-performance statistics collection for 100Gbps deployments
- Unsurpassed granularity for collection of subscriber statistics
- Real-time and historical statistics available
- Customized reports delivered on-demand
- Application delivery networking via advanced traffic steering
- ODBC Connector for big data connectivity

Maestro Policy Engine Key Features:

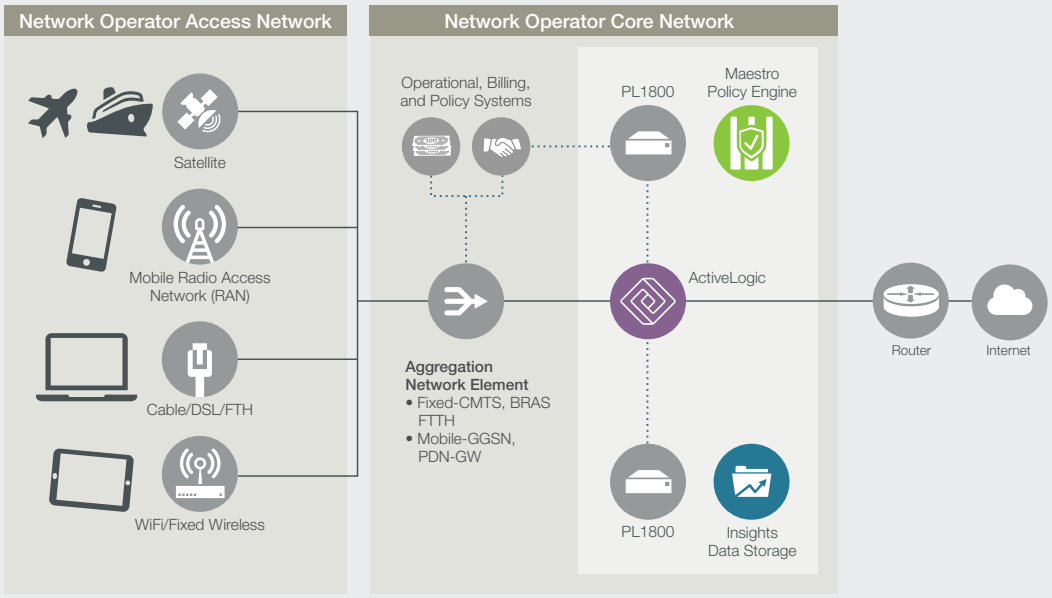
- Contextual awareness, including tier/plan, location, and device
- Diameter-based 3GPP interface support for policy control, monitoring, application signalling, and usage counting
- Layer-7 application metering for application-based charging and monitoring
- Real-time policy enforcement via Gx and Sd interfaces, connecting third-party PCRFs and ActiveLogic

NETWORK INTEGRATION

The PL1800 platforms tightly integrate with other Active Network Intelligence nodes, including ActiveLogic, within the operator's core network to enable a variety of policy-based provisioning, monitoring, and management functions.

Figure 1

Typical PL1800 Deployment



PL1800 PLATFORM
SPECIFICATIONS

Net Weight of Product	30.8 kg (68 lbs)
Dimensions (W x H x D)	48.2 cm W x 8.68 cm H x 68.4 cm D
Chassis	2 RU, Ready Rails™ Sliding Rails
Max Power Consumption	495W - 1100W
AC Power Specifications	Input Voltage: 100 VAC to 240 VAC nominal Input Current (Max.): 3.96 Amps @ 100VAC 1.70 Amps @ 240VAC Power Connectors: 2 Redundancy: 1+1
DC Power Specifications	Input Voltage: -36VDC to -72DC, -48VDC nominal Input Current(Max.): 10A @-48VDC Power Connectors: 2 Redundancy: 1+1
Storage Temperature	-40 C to 65 C (-40 F to 149 F)
Storage Humidity	5% to 85% (non-condensing)
Operating Temperature	10 C to 40 C X (50 F to 95 F)
Operating Humidity	5% to 95% (non-condensing)
Heat Dissipation	1908 BTUs/hour
MTBF	124,000 hours
Airflow	Front-to-Back / Side-to-Side / Passive Non-Rack Mount
Management Interfaces	2 x 10/100/1000 RJ-45 Ethernet & 2 x 10GE SFP+ Ports
Console Interfaces	1 x DB9 Serial Interface
Memory: PL1840 **Memory: PL1860** **Memory: PL1881**	192Gb RAM (RDIMM) 384Gb RAM (RDIMM) 384Gb RAM (RDIMM)
Full Integrated Component List	4x 1GB, 4x 10GB, 2x 10GB+2 x 1GB, or 2 x 25GB NDC 2 x 960GB SSD SATA Read Intensive 6Gbps 512e 2.5in Hot-Plug Drive RAID 1 (System Disk)
Optional Component List	
Hot-Swappable Components	Power Supply Units (one at a time) Hard Drive Disk (one at a time)
Field-Replaceable Components	Power Supply Units (PSU) Hard Drive Disk (HDD)
Internal Add-On Options	9 or 18 x 2.4TB HDD RAID6 or RAID10 Bundle 2 x 800G SSD RAID1 Bundle H840 EXTRAID 8GB NV Cache X520 DP 10Gb DA/SFP+ FULL 495W/750W/1100W AC PSU or 1100W DC
Storage Capacity (External)	SN1201, SN1204, SN2421

PERFORMANCE of PacketLogic 1800 Platforms

PLSD Data Collection for Insights/StatsFS

System Model	PL1840	PL1860
FPs	3 FPs	9 FPs
Throughput	75.20 Gbps	232.87 Gbps
CPS	286202	886203
Concurrent Connections	9435920	28469738
CPU Load	2%	4%

[1] Depending on configuration/features used

Insights Data Storage Performance

Measurements	23 Dimensions (Supported Subscriber Count)	7 Dimensions (Supported Subscriber Count)
Wireless	550K	700K
Wireline	300K	450K

Maestro Policy Engine PL1800

System Model	PL1840
Number of Subscribers	<20M[1]
Concurrent Subscribers	<20M[1]
Transactions Per Second Subscriber Awareness Diameter (Gx/Sd+Gy)	 <60K[1] <15K[1]
Interfaces	3GPP-compliant Gx/Sd interface to Policy and Charging Rules Function (PCRF); 3GPP-compliant Gy interface to Online Charging Systems (OCS); 3GPP-compliant and Call Data Records (CDR) to Offline Charging Systems (OFCS); JSON-Bulk/ UDP; REST; SOAP; GTP-C; NAT over Syslog; RADIUS; DHCP;CSV file streaming

[1] Depending on configuration/features used

ABOUT SANDVINE

Sandvine helps organizations run world-class networks with Active Network Intelligence, leveraging machine learning analytics and closed-loop automation to identify and adapt to network behavior in real-time. With Sandvine, organizations have the power of a highly automated platform from a single vendor that delivers a deep understanding of their network data to drive faster, better decisions. For more information, visit **sandvine.com** or follow Sandvine on Twitter at **@Sandvine.**

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