Oracle Enterprise Operations Monitor: Real-Time Voice over Internet Protocol Monitoring and Troubleshooting
Introduction

Oracle Enterprise Operations Monitor is a real-time, end-to-end, service monitoring, troubleshooting, and analytics solution that provides unprecedented insight into Voice over IP (VoIP) and unified communications (UC) networks for enterprise customers. Oracle Enterprise Operations Monitor enables enterprises to efficiently and securely deploy IP networks, reduce operational costs, increase user satisfaction, and prevent voice fraud. It also helps enterprises troubleshoot call quality issues in real time with deep drill-down capabilities for both media and signaling—a true differentiator in the market. Oracle Enterprise Operations Monitor is a proven solution with more than 100 deployments globally.

This white paper provides an overview of Oracle Enterprise Operations Monitor, including products, features, deployment architecture, and optional extensions. It also details how Oracle Enterprise Operations Monitor can help enterprise customers increase the ROI of VoIP and UC deployments and move beyond individual element management to benefit from real-time, network-wide visibility into multivendor IP communications networks.
Overview

Oracle Enterprise Operations Monitor comprises network probes linked to a client dashboard through an unrivaled correlation engine. Together, these elements provide the underlying system that powers Oracle Enterprise Operations Monitor. Network probes are available in multiple form factors, including software running on commercial off-the-shelf (COTS) hardware and a software component integrated into Oracle Communications Session Border Controllers (SBCs). Oracle Enterprise Operations Monitor is capable of monitoring any VoIP network—agnostic to equipment vendors—using deployed Oracle Communications Session Border Controllers (SBCs). Oracle Enterprise Operations Monitor comprises

- Oracle Enterprise Operations Monitor
- Oracle Communications Fraud Monitor

Each product can be operated independently or combined to help enterprises master a variety of challenges when running IP voice and video networks. Oracle Enterprise Operations Monitor comes with full support for a range of standard protocols, including Session Initiation Protocol, Real-Time Transport Protocol (RTP), Media Gateway Control Protocol, and H.248/MEGACO. It offers seamless integration with third-party management products.

Key Functions and Features

Oracle Enterprise Operations Monitor helps network operators improve their productivity and efficiency by providing a high-level overview of what is actually happening in the network in real time with drill-down capability for rapid troubleshooting. Some of the key features include

- End-to-end call correlation and analytics in real time
- Segmentation of the network path for fast and accurate problem localization
- On-demand troubleshooting down to the individual employee, agent, or customer level
- Media quality analysis, including R-value scores and mean opinion scores (MOSs)
- Unparalleled insight and analysis of signaling messages
- Real-time scoring and alerting to VoIP fraud issues
- Embedded Oracle Enterprise Operations Monitor software on Oracle’s session delivery and control infrastructure, which eliminates the need to place additional monitoring equipment in the network
- Intuitive and simple graphical user interface (GUI)
- Oracle Enterprise Operations Monitor is a passive service assurance suite that enables proactive monitoring, rapid troubleshooting, and an array of reporting options. Some of the key functions include
- Captures traffic from VoIP and UC networks
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- Collects raw messages from probes and correlates these messages into end-to-end call message flows
- Calculates 200 out-of-the-box, custom key performance indicators (KPIs)
- Renders gathered data to a web interface and makes it available to external applications via the REST API
- Enables fast root cause analysis with intuitive drill-down capabilities to a per-message view

Proactive Monitoring

Oracle Enterprise Operations Monitor analyzes the received traffic and triggers alerts when thresholds are exceeded. It detects and generates alerts for network abuse, fraud, spam over internet telephony, and denial of service attacks. Oracle Enterprise Operations Monitor can connect multiple applications and allows for integration with existing applications. It offers a web interface that is easy to use for nontechnical staff and that includes multiple fault and trend views to help identify potential service quality degradations in a VoIP network. For example, voice quality status is reflected in the colors used by Oracle Enterprise Operations Monitor to display charts, which appear green or red based on the values of MOS, R-factor, packet loss, burst loss, and jitter.

Figure 1. Customizable web-based dashboards enable proactive monitoring of network-wide information.

Oracle Enterprise Operations Monitor dashboard displays are designed to streamline proactive monitoring and quickly localize problems. They are constantly updated with real-time data, enabling network personnel to identify the next actions to support remediation. If a user complains about not being able to place a call or about experiencing poor voice quality, the support team can review the relevant call statistics by entering the number of the user. Oracle Enterprise Operations Monitor eliminates the need to reproduce problems. The entire procedure takes no more than a few seconds and dramatically shortens the duration of support calls. The web interface offers flexible options for restricting views of Oracle Enterprise Operations Monitor data to maintain appropriate authorizations and the security of sensitive information.
Troubleshooting and Visibility

Oracle Enterprise Operations Monitor identifies each leg of a session in real time. This feature is essential for troubleshooting and for providing deep device visibility and accurate statistics.

Oracle Enterprise Operations Monitor is unique in that the current calls are updated in real time and include the following information:

- KPIs
- Call status
- Call duration
- Codec used
- Call audio quality

![Diagram](image)

Figure 2. Oracle Enterprise Operations Monitor enables network operations staff to analyze voice calls on a network-wide basis to measure call characteristics, isolate problem areas, and consistently improve voice quality characteristics.

Oracle Enterprise Operations Monitor can save a history of calls, registrations, and other events, which enables network operators to investigate historical problems without having to reproduce them.

Integration and Reporting

Oracle Enterprise Operations Monitor offers a collection of tools and services that simplify integration and interoperability with a range of network management system, business intelligence, and customer relationship management applications. A scripting API enables local access to all the data gathered by
Oracle Enterprise Operations Monitor using Python, and a REST API enables external applications to access Oracle Enterprise Operations Monitor data.

For example, an external application can gather custom data such as the list of users registered from a phone with special firmware, successful call rate, or number of users with more than two contacts. The resulting information can be used to build valuable statistics.

Oracle Enterprise Operations Monitor also supports Simple Network Management Protocol for generating alerts to third-party applications. This integration flexibility makes Oracle Enterprise Operations Monitor future-proof for growing networks.

Deployment Architecture

Oracle Enterprise Operations Monitor software is installed on the following physical platforms:

Probes

Oracle Enterprise Operations Monitor probes collect and analyze data feeds from the network. Probes are deployed across the infrastructure to produce a network-wide view of performance and analyze trends. Probes serve two primary functions.

- Collect packet captures of signaling messages (SIP, ISDN User Part, and so on) and forward them to the Oracle Enterprise Operations Monitor Mediation Engine for correlation and analysis
- Collect and analyze local RTP media streams and send the results to the Mediation Engine for correlation with relevant signaling information

Oracle Enterprise Operations Monitor probes are available in two form factors.

- Software that can be loaded on COTS Linux servers. (Oracle Enterprise Operations Monitor probe software is offered at no additional cost; servers must be procured independently.)
- Probes that are embedded into Oracle Communications Session Border Controller and Oracle Enterprise Communications Broker. This form factor enables network operators to optimize their IP communications networks while reducing network cost and complexity. The embedded probes leverage Oracle encryption technologies to gain visibility of network traffic.

Mediation Engine

The Oracle Enterprise Operations Monitor Mediation Engine receives compressed signaling and RTP metadata from the probes and performs further processing, call correlation, and database functions. The Mediation Engine and probes can be connected through secure channels for secure data transactions. The Mediation Engine performs massive processing and correlation of a wide range of messages to produce a network-wide view of all calls in real time.

The Oracle Enterprise Operations Monitor renders the correlation, KPIs, and metrics, and an intuitive GUI simplifies analysis and troubleshooting operations.
The Mediation Engine also provides the data to the Oracle Communications Fraud Monitor product for traffic and trend analysis, enabling it to identify suspicious and fraudulent activity and generate alerts.

Oracle Enterprise Operations Monitor offers full, end-to-end correlation of all calls in real time and high-level visibility of the network for management and troubleshooting.

Oracle Enterprise Operations Monitor Products for Enterprise Customers

Oracle Enterprise Operations Monitor increases the ROI of VoIP and UC deployments and is composed of two products addressed to enterprise customers.

- Oracle Enterprise Operations Monitor
- Oracle Communications Fraud Monitor

Oracle Enterprise Operations Monitor

Oracle Enterprise Operations Monitor includes a range of features for proactive network monitoring. It captures all signaling messages and offers full, end-to-end correlation of all calls in real time. Various configuration options can further divide and filter information to provide exactly the right network view and a view of the complete user base, enabling enterprises to increase service quality, reduce operations costs, and increase efficiency. Oracle Enterprise Operations Monitor is an easy-to-use tool that enables root cause analysis of problems related to a user, a user group, a trunk, a network device, or an IP address. This enables help desk and support teams to efficiently resolve reported incidents.

Oracle Enterprise Operations Monitor also analyzes and displays media quality statistics forwarded by the probes, including

- KPIs to measure media stream quality—packet loss rate, burst packet loss rate, jitter, latency (if provided by endpoint), R-factor (audio), and MOS Conversational Quality Estimate (audio)
• Codecs negotiated, codecs used, length of media streams, source and destination addresses, and ports
• Individual RTP streams (multiple directions / multiple legs) providing full visibility of the overall and local media quality

Oracle Enterprise Operations Monitor uses multiple information sources to perform quality analysis, including
• RTP analysis; no decoding required
• The International Telecommunication Union Standard G.107 computational model
• Full protocol support for RTP Control Protocol (RTCP), RTCP Extended Report, X-RTP-Stat, RTP-RxStat, and P-RTP-Stat

Figure 4. Oracle Enterprise Operations Monitor enables enterprise customers to measure and monitor service health in real time.

Oracle Communications Fraud Monitor

Oracle Communications Fraud Monitor is a self-learning, scalable solution to help network operators detect toll fraud and prevent it before damage is done. To identify fraudulent calls, Oracle Communications Fraud Monitor builds on end-to-end correlated, network-wide service layer data to perform a real-time analysis of the user behavior and compare it with the individual behavioral pattern that is automatically learned by the system for each user. The solution collects real-time information about all users, customers, trunks, and IP addresses.
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Figure 5. Oracle Communications Fraud Monitor has an easy-to-use web-based interface for simplifying configuration, management, monitoring, and operations. The lower chart shows the red baseline closely matching the current traffic, while the score information in the upper chart reflects peaks that far exceed usual points awarded and indicate blacklist triggering due to a fraud incident.

Oracle Enterprise Operations Manager Optional Extensions

Oracle Enterprise Operations Manager can be enhanced by purchasing extensions with additional functionality. The add-ons provide a customized solution for specific user requirements.

App Support Extension

The App Support extension for Oracle Enterprise Operations Manager adds support for customer-specific applications and seamlessly integrates into web applications. It enables enterprises to develop custom functionality that is unique to their needs or not available in Oracle Enterprise Operations Manager.

The App Support extension
- Operates independently from release schedules and product lifecycles
- Runs in a secure sandbox environment
- Is future-proof and independent from development roadmaps
- Provides applications full access to all internal real-time and historic data structures
- Enables applications to modify and extend the Palladion Enterprise web-based GUI

REST Remote API Extension

The REST Remote API extension for Oracle Enterprise Operations Manager provides an open interface to Oracle Enterprise Operations Manager so third-party applications can access real-time and historical data. The internal data—including raw and aggregated data such as traces, calls, registrations, KPIs, and user experience information—can then be exposed to third-party systems. Some of the key features include
Remote execution of applications and download of recorded media streams

Easy-to-use interface based on modern RESTful paradigm

Access to all network and user information

Ability to use Oracle Enterprise Operations Manager information in mashups

Easy integration with umbrella systems, data warehouses, network management systems, and more

Self-explanatory interface with link-based structure that is directly accessible with a web browser or command-line tools such as cURL and Wget

State-of-the-art Representational State Transfer for remote data access through implementations in all modern programming languages

CDR Generation Extension

The CDR Generation extension for Oracle Enterprise Operations Manager generates call detail records (CDRs) for successful and failed calls based on Oracle Enterprise Operations Manager end-to-end call correlation.

The CDR Generation extension

- Includes all internal information
- Generates preliminary CDRs as well as CDRs for failed calls
- Provides CDR data as comma-separated value files that can be accessed remotely using an interface for FTP- or Secure File Transfer Protocol–based GUIs

Gateway Control Protocol Extension

The Gateway Control Protocol extension for Oracle Enterprise Operations Manager extends the set of supported signaling protocols by the relevant gateway control protocols H.248, MGCP and MEGACO. Some of the key features include

- Full correlation of control protocols with other signaling protocols
- End-to-end troubleshooting and monitoring capabilities
- Sophisticated correlation algorithm
- Support for all relevant transport protocols (Stream Control Transmission Protocol [SCTP], UDP, and TCP)

Mediation Engine Connector Extension

Mediation Engines are installed in each geographical location of a multisite enterprise network and serve as monitoring nodes. The Mediation Engine Connector extension of Oracle Enterprise Operations Manager provides an overview of the data collected by Mediation Engines, offering a global dashboard and implementing global KPIs.
Mediation Engine Connector simplifies the management of multiple Mediation Engines and maximizes the benefits of Enterprise Operations Monitor across multiple locations. The global search and drill-down tools of Mediation Engine Connector enable enterprises to scale the troubleshooting features of Oracle Enterprise Operations Manager across multiple sites. Operations personnel can rapidly gain an understanding of the overall status of the global network while obtaining the ability to drill down to troubleshoot issues.

**Implementation Service**

Oracle Professional Services offers a robust deployment service that offers customers a thorough and streamlined implementation of Oracle Enterprise Operations Manager. It combines several established Oracle Professional Services offerings into a single service solution tailored for Oracle Enterprise Operations Manager deployments. Oracle Professional Services network engineers will design, optimize, and produce all documentation for Oracle Enterprise Operations Manager configurations necessary to ensure the successful integration of Oracle Enterprise Operations Manager solutions. Engaging experienced Oracle Professional Services engineers not only brings industry experience and best practices to the design and implementation of Oracle Enterprise Operations Manager, but it also ensures that deployment complexity and risk is reduced while desired operational and business objectives are met effectively and on schedule.

**Conclusion**

Oracle solutions enable the hyper-connected enterprise with enterprise federation capabilities that seamlessly connect users to each other, enable rich multimedia customer interactions, and automate business processes, for significant increases in productivity, efficiency, and ROI. Oracle network visibility solutions work in real-time, in end-to-end, and across multivendor networks to drastically reduce the mean time to identification (MTTI) and mean time to resolution (MTTR) of potential issues.

Enterprise network operators are looking for ways to optimize their IP communications networks, not only to reduce cost and complexity, but also to better deploy new value-added applications and services. Using Oracle’s Enterprise Operations Manager in enterprise organizations enables network administrators to get the most out of their IP communications networks with unique, real-time monitoring capabilities.