

Monitoring in the Mobile Network

Today's mobile operators compete by offering a wide range of services. Business success depends on the quality and reliability of those service offerings. But if operators cannot measure signal integrity, performance, and which applications are driving network capacity, they can't maintain high service quality or address performance issues when they arise. With non-intrusive, independent monitoring of the optical signal at key points in the mobile network, operators can continually measure signal quality and application usage, so they can become more competitive by addressing capacity and service quality issues as soon as they arise.

Monitoring Challenges

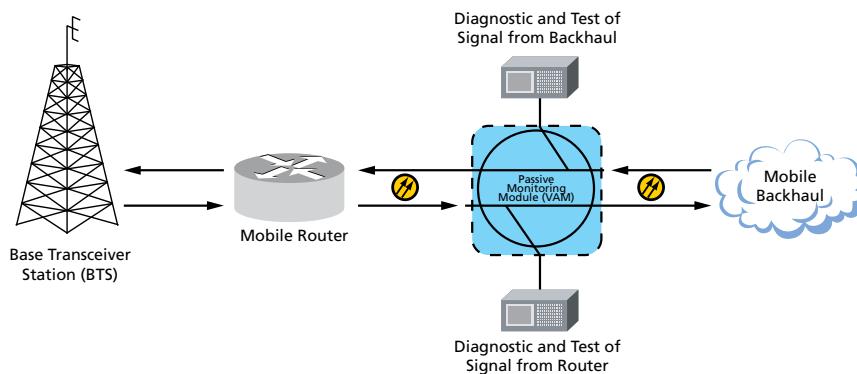
For a comprehensive performance picture and to confidently identify the types of services being delivered, mobile operators must monitor the quality of the optical signal driving services to the edges of the network, as well as signals at multiple points in the network. Monitoring should be used to determine signal quality and capacity usage and change.

Signal quality

From a pure operational standpoint, it is essential to conduct real-time **non-intrusive** performance monitoring on the optical signals that distribute services at the data center, mobile switching center (MSC), radio network center (RNC), base station controller (BSC), and the cell site itself. In these cases, operators monitor the signal integrity and (at the cell site) the quality of service being delivered by a backhaul carrier.

This monitoring allows operators to identify performance issues such as unusually high numbers of dropped packets in data transmissions, or whether the **timing** or **latency** of voice packets should be adjusted in IP voice networks. As these issues are identified, operators can make adjustments in router configurations or add capacity where needed. Such monitoring also helps operators understand whether or not backhaul carrier traffic is in compliance with service level agreements.

APPLICATION NOTE



Capacity usage

To optimize their business practices, operators should also monitor the optical signal to identify content consuming network capacity, maintain their quality of service (QoS), and minimize dropped calls and services. As providers introduce more services, capacity can be driven by video, SMS, e-mail, web browsing, gaming, or other applications. By monitoring, they can understand which of these services is driving demand for capacity.

Optical monitoring of the signal provides the maintenance team with a non-intrusive access point to monitor the characteristics of the signal. By knowing the characteristics of the signal, the overhead, latency, synchronization, crosstalk, and jitter issues can be identified before they affect the service.

This knowledge helps operators manage network capacity and the service mix to deliver optimum customer satisfaction, while maintaining the QoS. It also provides important data on the growth of service uptake so they can adjust marketing campaigns. For example, if a growing percentage of traffic is being driven through smart phones, additional marketing for smart phone applications may yield additional subscribers.

Monitoring Options

It is always possible to monitor optical traffic via network taps at routers and switches. However, these taps can impact router/switch performance and they can only be used at facilities where this equipment is located, which makes monitoring traffic via network traps time-consuming and labor-intensive.

ADC value-added monitoring modules (VAMs) are a better way to perform network monitoring. These modules can be placed anywhere there is a fiber drop allowing monitoring at cell sites or other remote locations. VAMs are relatively small, consume no power, and offer plug-and-play connectivity to the fiber.

Additionally, VAMs can be used to create a demarcation point between backhaul provider networks and operator assets at cell sites, and they can also be used to split optical signals in order to provide additional fiber pathways—either within a location or among locations, for redundancy.

ADC Monitoring Solutions

ADC offers the broadest and most flexible portfolio of VAM solutions, enabling non-intrusive monitoring of optical traffic at any location in the wireless network. The ADC VAM system includes VAM chassis and modules that support any application, whether in the data center, MSC, RNC, BSC, or cell site.

ADC value-added modules (VAMs) enable non-intrusive monitoring of the optical signal from fiber in any location, whether in the data center, MSC, RNC, BSC, or cell site.

ADC offers pre-configured monitor modules for duplex Rx/Tx circuits in a range of monitor split ratios from 95/5 down to 50/50. (Figure 1)

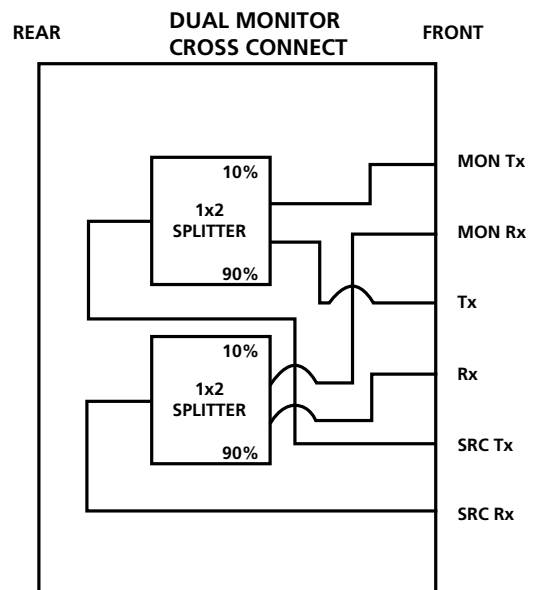


Figure 1:
Typical VAM monitoring circuit module



Figure 2:
MicroVAM in FMT chassis



Figure 3:
MicroVAM in NGF block

ADC offers a wide range of module types from its unique, high-density MicroVAMs to industry-standard LGX® VAMs supporting a range of density and configurations. (Figure 2)

ADC's VAMs fit a range of fiber frame solutions from high density NGF to standard 19" or 23" equipment rack solutions, enabling VAM deployments in newly-built as well as legacy standard fiber frame equipment deployments. (Figure 3)

Conclusion

Non-intrusive optical monitoring is essential for competing in a world where quality of service wins. Monitoring gives mobile operators the information they need to adjust capacity, latency, and optimize network performance to support popular applications, ensure that backhaul contractors are meeting SLAs, and leverage trends in user demand with appropriate marketing efforts.

ADC's VAM system offers the broadest and most flexible range of products to cost-effectively support optical signal monitoring and troubleshooting in any carrier location.

For more information, contact ADC Sales at 1-800-366-3891 (North America only) or visit www.adc.com.

Abbreviations

- 4G** 4th Generation
- AUC** Authentication Register
- BTS** Base Transceiver Station
- BSC** Base Station Controller
- EIR** Equipment Identity Register
- FMT** Fiber Management Tray
- GSM** Global System for Mobile Communication
- HLR** Home Location Register
- LAN** Local Area Network
- MSC** Mobile Switching Center
- MTSO** Mobile Telephony Switching Office
- NGF** Next Generation Frame
- RNC** Radio Network Center
- VAM** Value Added Module
- VLR** Visitor Location Register
- WiFi** Wireless Fidelity
- WiMAX** Interoperability standard of IEEE 802.16 (e)

LGX is a registered trademark of Furukawa Electric North America, Inc.

APPLICATION NOTE



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