Advanced Mobile Network Troubleshooting and Fault Management Training Course



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Sharm El-Sheikh

4100 € (Per Person)

Ref: #TEL9297_285185

Course Introduction / Overview:

In today's hyper-connected world, the reliability of mobile networks is paramount. This course provides a comprehensive exploration of advanced troubleshooting and fault management techniques for modern 4G LTE and 5G networks. Participants will move beyond basic problem-solving to master a systematic, end-to-end approach for diagnosing and resolving complex network issues, from the Radio Access Network (RAN) to the Core. The curriculum is designed to build deep analytical skills, enabling professionals to perform effective root cause analysis (RCA), minimize network downtime, and enhance service assurance. As detailed by experts like Dr. Martin Sauter in his works, including "From GSM to LTE-Advanced Pro and 5G," understanding the intricate signaling and data flows is crucial for effective fault localization. BIG BEN Training Center has developed this program to equip engineers and technicians with the practical knowledge and strategic mindset needed to maintain high-performance, resilient mobile infrastructures. This training focuses on real-world scenarios, preparing attendees to tackle performance degradation, service outages, and intermittent faults with confidence and precision, ensuring optimal quality of service for end-users.

Target Audience / This training course is suitable for:

- Network Operations Center (NOC) Engineers.
- Radio Frequency (RF) Planning and Optimization Engineers.
- Core Network Specialists and Engineers.
- Field Technicians and Operations Staff.
- Technical Support and Service Assurance Professionals.
- System Integration and Test Engineers.
- Telecom Project Managers seeking technical depth.
- IT professionals managing private LTE/5G networks.

Target Sectors and Industries:

- Telecommunications Service Providers.
- Mobile Network Operators (MNOs).
- Managed Service Providers (MSPs).
- Internet of Things (IoT) Solution Providers.
- Public Safety and Emergency Services (e.g., private networks).
- Government, Defense, and Intelligence Agencies.
- Large enterprises with private cellular networks.
- Network Equipment and Infrastructure Vendors.

Target Organizations Departments:

- Network Operations and Management.
- Engineering and Planning.
- Technical Support and Customer Care.
- Service Assurance and Quality Management.
- Research and Development.
- Field Operations and Maintenance.
- Information Technology (IT).

Course Offerings:

By the end of this course, the participants will have able to:

- Apply a structured troubleshooting methodology for mobile network incidents.
- Diagnose and resolve common faults within the 4G/5G Radio Access Network (RAN).
- Identify and troubleshoot issues in the Evolved Packet Core (EPC) and 5G Core (5GC).
- Perform root cause analysis (RCA) to prevent recurring network problems.
- Utilize key performance indicators (KPIs) and key quality indicators (KQIs) for fault detection.
- Analyze signaling traces and network logs to pinpoint connectivity and service issues.
- Implement proactive fault management and network monitoring strategies.
- Address challenges related to VoLTE/VoNR, network slicing, and IoT services.
- Develop effective incident management and escalation procedures.

Course Methodology:

This training course employs a dynamic and interactive learning methodology designed for maximum knowledge retention and practical application. At BIG BEN Training Center, we believe in learning by doing. The program is built around a blend of expert-led instruction, in-depth technical presentations, and real-world case study analysis. Participants will engage in collaborative group discussions and problem-solving sessions, allowing them to share experiences and learn from their peers. A significant portion of the course is dedicated to simulated troubleshooting scenarios, where attendees will apply systematic fault diagnosis techniques to resolve complex network issues in a controlled environment. This hands-on approach ensures that theoretical concepts are immediately reinforced with practical skills. The facilitator will provide continuous feedback and guide participants through complex topics, ensuring a deep understanding of both foundational principles and advanced fault management strategies. The methodology fosters a highly engaging and effective learning environment that prepares professionals for immediate on-the-job challenges.

Course Agenda (Course Units):

Unit One: Foundations of Mobile Network Fault Management

- Introduction to 4G/5G network architecture and interfaces.
- The fault management lifecycle: detection, isolation, correction, and documentation.
- Understanding network alarms, events, and logs.
- Key Performance Indicators (KPIs) for network health monitoring.
- Structured troubleshooting methodologies (e.g., OSI model, divide and conquer).
- Tools of the trade: overview of protocol analyzers, probes, and monitoring systems.
- Fundamentals of signaling protocols in mobile networks (e.g., S1AP, NAS, Diameter).

Unit Two: Troubleshooting the Radio Access Network (RAN)

- Diagnosing cell coverage and capacity issues.
- Investigating call drop and connection failure causes.
- Troubleshooting handover failures (intra-RAT and inter-RAT).
- Analyzing and resolving radio interference problems.
- Managing Physical Uplink Shared Channel (PUSCH) and Physical Uplink Control Channel (PUCCH) issues.
- Resolving synchronization and timing problems in the RAN.
- Best practices for RAN parameter tuning and optimization for fault prevention.

Unit Three: Diagnosing the Evolved Packet Core (EPC) and 5G Core (5GC)

- Troubleshooting attachment and registration procedures (MME/AMF).
- Resolving session establishment and data connectivity issues (SGW/UPF, PGW/SMF).
- Analyzing and debugging Diameter and HTTP/2 signaling problems.
- Diagnosing policy and charging control faults (PCRF/PCF).
- Troubleshooting mobility and roaming interface issues (S6a, S10).
- Investigating issues within the IP Multimedia Subsystem (IMS) for VoLTE/VoNR.
- Fault management in virtualized environments (NFV/SDN).

Unit Four: Advanced Diagnostics and Root Cause Analysis (RCA)

- Advanced trace analysis using tools like Wireshark.
- Correlating data from multiple network sources for effective RCA.
- Techniques for isolating intermittent and complex network faults.
- Applying the "Five Whys" and fishbone diagrams in a telecom context.
- Documenting findings and creating effective incident reports.
- Leveraging network monitoring systems for proactive fault detection.
- Introduction to log analytics and pattern recognition for troubleshooting.

Unit Five: Proactive Management and Future Technologies

- Strategies for proactive and predictive network maintenance.
- Automating fault detection and initial diagnostics.
- Troubleshooting challenges in network slicing and service-based architecture.
- Fault management for massive IoT (mMTC) and critical communications (URLLC).
- Introduction to AI and Machine Learning in predictive fault analysis.
- Developing robust network resilience and disaster recovery plans.
- Security incident response and its intersection with fault management.

FAQ:

Qualifications required for registering to this course?

There are no requirements.

How long is each daily session, and what is the total number of training hours for the course?

This training course spans five days, with daily sessions ranging between 4 to 5 hours, including breaks and interactive activities, bringing the total duration to 20 - 25 training hours.

Something to think about:

As networks move towards full automation and AI-driven operations, what is the evolving role of the human troubleshooter in fault management?

What unique qualities does this course offer compared to other courses?

This course distinguishes itself by offering a holistic, end-to-end perspective on mobile network troubleshooting, seamlessly integrating both the Radio Access Network (RAN) and the Core Network. Unlike programs that focus on isolated domains, this training emphasizes the intricate interplay between different network elements, which is critical for resolving complex, multi-faceted faults. Our methodology prioritizes practical, real-world application over purely theoretical instruction. Participants engage with meticulously crafted case studies and simulated scenarios that mirror the challenges they face daily, enabling them to develop a systematic and analytical mindset for root cause analysis. Furthermore, the curriculum is forward-looking, addressing the emerging complexities of 5G, network slicing, and IoT service assurance. It moves beyond reactive problem-solving to instill principles of proactive and predictive fault management, preparing attendees not just for today's network issues, but for the challenges of tomorrow's increasingly automated and virtualized infrastructures. The focus is on building deep, transferable diagnostic skills rather than proficiency with a single vendor's tools.