Advanced IoT Connectivity and NB-IoT Engineering Training Course



22 - 26 Nov 2026

Manama

4400 € (Per Person)

Ref: #TEL4820_238502

Course Introduction / Overview:

This comprehensive training course provides an in-depth exploration of the Internet of Things (IoT) connectivity landscape, with a specialized focus on Narrowband IoT (NB-IoT) engineering. As the world moves towards massive machine-type communication (mMTC), understanding low-power wide-area network (LPWAN) technologies is no longer optional but essential for innovation. This program is meticulously designed to bridge the gap between theoretical knowledge and practical implementation, guiding participants through the entire NB-IoT ecosystem. Drawing on principles discussed by leading academics like Dr. Ovidiu Vermesan, we will dissect the technical architecture, deployment strategies, and security considerations that define successful IoT solutions. The curriculum, influenced by foundational texts such as "Internet of Things: From Hype to Reality" by Ammar Rayes and Samer Salam, ensures a robust and current learning experience. At BIG BEN Training Center, we are committed to empowering professionals with the skills to design, deploy, and manage cutting-edge cellular IoT networks, transforming industries from smart metering to industrial automation. This course is the definitive guide for engineers and technical managers aiming to master the premier connectivity solution for the next generation of connected devices.

Target Audience / This training course is suitable for:

- IoT Solutions Architects.
- Telecommunications Engineers.
- Network Planners and Operators.
- Embedded Systems Developers.
- Firmware Engineers.
- R&D Professionals.
- Technical Project Managers.
- Product Managers for IoT Devices.
- System Integration Specialists.
- IT Professionals working with M2M communication.

Target Sectors and Industries:

- Telecommunications and Mobile Network Operators.
- Utilities and Smart Grid (e.g., Water, Gas, Electricity Metering).
- Logistics, Supply Chain, and Asset Tracking.
- Smart Cities and Public Infrastructure Management.
- Industrial Automation and Manufacturing (IIoT).
- Agriculture and Environmental Monitoring.
- Healthcare and Remote Patient Monitoring.
- Government, Public Safety, and Defense Agencies.
- Building Management and Smart Home Automation.

Target Organizations Departments:

- Engineering and Network Design.
- Research and Development (R&D).
- Network Operations Center (NOC).
- Product Development and Management.
- Information Technology (IT) and Infrastructure.
- Innovation and Strategy Departments.
- Technical Support and Field Operations.
- Systems Integration and Testing.
- Quality Assurance.

Course Offerings:

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

- Analyze the IoT connectivity landscape and differentiate between various LPWAN technologies.
- Master the technical architecture and 3GPP standards of Narrowband-IoT.
- Design and plan the deployment of an NB-IoT network, including RAN and core elements.
- Evaluate different NB-IoT deployment modes and their impact on network performance.
- Implement power-saving mechanisms like PSM and eDRX to optimize device battery life.
- Integrate NB-IoT modules with embedded systems and application platforms.
- Develop secure IoT solutions by applying end-to-end encryption and authentication protocols.
- Troubleshoot common connectivity, performance, and security issues in an NB-IoT environment.
- Assess the role of NB-IoT within the broader 5G and massive IoT ecosystem.
- Develop business cases and technical proposals for NB-IoT-based projects.

Course Methodology:

The training methodology at BIG BEN Training Center is designed to be highly interactive, practical, and engaging, ensuring participants gain not just theoretical knowledge but also tangible engineering skills. We employ a blended learning approach that combines expert-led instruction with hands-on activities. The course is structured around real-world case studies of NB-IoT deployments in sectors like smart metering and asset tracking, allowing participants to analyze challenges and successful strategies. Collaborative group workshops will encourage participants to work together on network planning simulations and solution design problems, fostering teamwork and critical thinking. Interactive sessions, Q&A panels, and open discussions are integrated throughout the five days to facilitate knowledge sharing and address specific participant queries. We emphasize a "learning by doing" philosophy, where complex concepts like protocol configuration and security implementation are demystified through practical examples and guided exercises. Our expert instructors provide continuous feedback and mentorship, creating a supportive learning environment that empowers participants to confidently apply their new skills in their professional roles immediately after the course.

Course Agenda (Course Units):

Unit One: Foundations of IoT Connectivity and LPWAN

- Introduction to the Internet of Things (IoT) Ecosystem.
- Understanding Machine-to-Machine (M2M) and IoT Communication.
- Overview of Wireless Communication Protocols for IoT.
- Deep Dive into Low-Power Wide-Area Networks (LPWAN).
- Comparative Analysis of LPWAN Technologies: NB-IoT, LoRaWAN, Sigfox.
- Introduction to Cellular IoT (CIoT) and its evolution.
- Exploring Use Cases for Different LPWAN Technologies.

Unit Two: The Technical Architecture of Narrowband-IoT (NB-IoT)

- Understanding the 3GPP Standards for NB-IoT (Release 13 and beyond).
- Detailed NB-IoT Network Architecture: UE, RAN, and Core Network.
- The NB-IoT Radio Interface and Physical Layer.
- NB-IoT Deployment Modes: In-band, Guard-band, and Standalone.
- Key Power Saving Features: Power Saving Mode (PSM).
- Advanced Power Optimization with Extended Discontinuous Reception (eDRX).
- Understanding NB-IoT Data Rates and Coverage Enhancement.

Unit Three: NB-IoT Network Planning and Deployment

- Principles of Radio Network Planning for NB-IoT.
- Link Budget Calculation and Coverage Prediction.
- Core Network Elements and Configuration for IoT.
- SIM and eSIM Management for Massive IoT Deployments.
- The Device Onboarding and Provisioning Process.
- Interference Management and Coexistence Strategies.
- Testing and Validation of NB-IoT Network Performance.

Unit Four: Developing and Integrating NB-IoT Applications

- Overview of NB-IoT Modules, Chipsets, and Development Kits.
- Application Layer Protocols: MQTT, CoAP, and LwM2M.
- Data Transmission and Payload Optimization Techniques.
- Integrating NB-IoT Devices with IoT Cloud Platforms.
- Firmware Over-The-Air (FOTA) Update Strategies.
- Building a Proof-of-Concept NB-IoT Solution.
- Best Practices for Scalable NB-IoT Application Development.

Unit Five: Security, Management, and Future of NB-IoT

- End-to-End Security in NB-IoT Networks.
- Authentication, Integrity, and Encryption Mechanisms.
- Troubleshooting Common NB-IoT Connectivity and Performance Issues.
- Analyzing Real-World Use Cases: Smart Agriculture, Logistics, and Utilities.
- The Role of NB-IoT in the 5G Ecosystem and Massive IoT (mMTC).
- Future Trends and Enhancements in Cellular IoT.
- Course Review, Final Q&A, and Action Planning.

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:

Considering the trade-offs between coverage, data rate, and power consumption, how might the evolution of NB-IoT within 5G ecosystems reshape business models for massive-scale industrial automation?

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

This course distinguishes itself by moving beyond a high-level overview of IoT technologies to provide a deep, engineering-focused masterclass in Narrowband-IoT. While many programs offer a comparative analysis of LPWAN options, our curriculum is uniquely structured around the complete lifecycle of an NB-IoT solution, from radio network planning and core network configuration to application development and security implementation. We prioritize practical, actionable knowledge over purely theoretical concepts, equipping participants with the skills to solve real-world deployment challenges. The content delves into critical technical details often overlooked, such as link budget calculations, power-saving mode configurations (PSM/eDRX), and firmware-over-the-air (FOTA) strategies. Furthermore, the course is forward-looking, dedicating significant time to the strategic role of NB-IoT within the emerging 5G and massive IoT landscape. This ensures that participants not only master the technology as it exists today but are also prepared for its future evolution, making them invaluable assets in the rapidly advancing field of cellular IoT.