

# Numbering in Telecommunications

## Numbering, ENUM & Number Portability in Telecommunications

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### Day 1 — Foundations of Telecom Numbering

#### Session 1: Introduction to Numbering Systems in Telecom

- Definition and purpose of numbering
- Importance in global telecom infrastructure
- Overview of ITU-T standards (E.164, E.212)
- Country codes, area codes, subscriber numbers
- Numbering plan examples (India, GCC, Europe)
- Evolution from PSTN to IP-based numbering

#### Session 2: National Numbering Plans

- How numbering plans are structured locally
- Fixed vs. mobile numbering schemes
- Short codes, emergency numbers, and toll-free numbering
- Regulatory management by national telecom authorities
- Practical exercise: Analyze your country's numbering plan

#### Session 3: Numbering Management & Allocation

- Number block assignment procedures
  - Number exhaustion and recycling
  - Number forecasting and capacity planning
  - Impact of new technologies (VoIP, IoT, 5G)
  - Case study: Numbering management in multi-operator environments
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### Day 2 — ENUM: Bridging Telephone and Internet Worlds

#### Session 4: Understanding ENUM (Telephone Number Mapping)

- What is ENUM and why it was created

- How ENUM links E.164 numbers to Internet resources via DNS
- ENUM components: NAPTR records, DNS zones, Tier 0–Tier 2 hierarchy
- ENUM domain examples and decoding

### **Session 5: ENUM Architecture, Operations & Implementation**

- ENUM query process step by step
- How ENUM supports VoIP and SIP call routing
- ENUM and NGN (Next Generation Networks)
- Public ENUM vs. Private ENUM deployments
- ENUM integration with IMS and IPX

### **Session 6: ENUM Governance, Security & Privacy**

- Role of ITU, IETF, and national regulators
  - ENUM trials and global adoption updates
  - ENUM privacy, security, and data ownership issues
  - ENUM policy frameworks and national numbering databases
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## **Day 3 — Number Portability Concepts and Mechanisms**

### **Session 7: Introduction to Number Portability**

- Concept and importance of number portability
- Regulatory and consumer protection background
- Types:
  - Mobile Number Portability (MNP)
  - Fixed-line Portability
  - Service Provider Portability

### **Session 8: Portability Architecture & Technical Operations**

- Centralized database (CDB) and routing mechanisms
- All Call Query (ACQ) vs. Onward Routing methods
- Local Number Portability (LNP) database functions
- Message flows and signaling protocols (MAP, SIP)
- Integration with billing and CRM systems

## **Session 9: Challenges & Security in Portability**

- Fraud prevention during porting
  - Porting delays, failures, and dispute handling
  - SIM swap and identity verification risks
  - Operational best practices from regulators and carriers
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## **Day 4 — Advanced Topics, Global Practices & Future Trends**

### **Session 10: Global Case Studies in Number Portability**

- MNP deployment and regulation in:
  - India
  - European Union
  - Middle East (UAE, Saudi Arabia)
  - North America
- Lessons learned and success factors

### **Session 11: Emerging Trends in Numbering & Portability**

- Number portability in 5G and VoIP environments
- Impact of OTT services (WhatsApp, Skype)
- Virtual numbers and cloud communications
- Numbering challenges in IoT and M2M

### **Session 12: Policy, Governance, and Future Directions**

- International cooperation and ITU recommendations
- Role of data protection laws (e.g., GDPR)
- Toward unified numbering databases and digital identity linkage
- The future of numbering: eSIM, blockchain-based identity