# APIs in Telecom – 2 days

## CONTENTS

This course provides a comprehensive introduction to the use of APIs in the telecom sector, covering essential principles, protocols, and real-world applications. Participants will explore how APIs enable automation, scalability, and innovation in telecom services, from billing and network management to 5G and IoT integrations.

Special attention is given to three initiatives: TMForums Open APIs, GSMA's Open Gateway and CAMARA. In the end we see a natural evolution of CAMARA with Aduna. With hands-on labs and case studies, learners will gain practical skills in API development, security, and management, tailored to the unique demands of telecom networks. This course is ideal for professionals aiming to enhance their expertise in API-driven telecom solutions.

## TARGET AUDIENCE

This course is suitable for anyone in telecom looking to leverage APIs for automation, interoperability, and scalability.

**Telecom Professionals and Engineers**
System architects, network engineers, and developers who design, maintain, or create applications for telecom networks, requiring knowledge of telecom APIs and standards.

**IT and Software Development Experts**
API developers, backend engineers, and cybersecurity analysts interested in telecom-specific protocols, security practices, and data privacy.

**Telecom Business and Operations Leaders**
Operations and technical project managers focused on enhancing efficiency, automation, and API lifecycle management in telecom.

**Innovators in 5G, IoT, and AI for Telecom**
Specialists in 5G, IoT, and AI seeking to leverage APIs for network slicing, IoT integration, customer service, and analytics.

## PREREQUISITES

This course is accessible to beginners with some IT background but will be most beneficial for those with prior exposure to telecom or software development fundamentals.

**Basic Understanding of Telecom Concepts**
Familiarity with telecom services and terms, such as network management, provisioning, and CRM, is helpful but not mandatory.

**Foundational Knowledge of APIs**
Basic understanding of what APIs are, including common types like REST and SOAP, and how they generally function.

**Technical Background in IT or Software Development**
Experience with programming concepts, especially with HTTP requests and JSON, will help learners get the most out of hands-on labs and coding examples.

**Awareness of Networking and Security Principles**
Basic knowledge of networking (e.g., IP, DNS) and security practices, including authentication methods (OAuth, API keys), will be beneficial for sections on telecom API security.

## Computer vs Telecom Industry

- History of Telecom vs Computer Industry: Why is there a difference in evolution and innovation? Challenges in early collaboration.

- Drivers of Convergence: What are the factors that are helping both industries to come closer.
- Virtualisation: Evolution of Physical servers to VMs - we can virtualise the hardware.
- Containers: Evolution of VMs to Containers - we can virtualise the OS too.
- Cloud Computing: Infrastructure on demand - scalability at our fingertips.
- Data-driven services: Increased demand for data drives the industry forward.
- SDN and NFV: Provisioning, monitoring, and managing network resources as software.
- Telecom specific protocols: First attempts at providing extra services via telecom specific protocols.

## APIs

- What is an API
- API Types
- REST APIs: REST vs Web calls. Components and Use cases. GET, POST, PUT, DELETE REST calls.
- SOAP APIs: Features and examples. Components and Use Cases. SOAP Requests and Responses. Error handling with SOAP.
- GraphQL APIs: Advantages and examples. Components. Facebook Graph API, Microsoft Graph API.
- REST vs SOAP vs GraphQL: Protocols, Message Formats, Transport, State, Error Handling, Performance and Use Cases.

## APIs in Telecom

- Common Use Cases: Billing APIs, Provisioning APIs, Network Management APIs, Customer Data APIs
- API Architecture: Typical API Architecture in Telecoms today.
- API Scaling: Why is scaling important? Best Practices on achieving easy scalability.
- API Security: Common Threats and Best Practices.
- API Containerisation: Microservices as Containers - architectural style and tools for implementation
- API Interoperability: Why is interoperability important? Best practices for achieving it.
- API Architecture examples: Dynamic scaling, IoT, 5G success stories.

## APIs in 5G

- History of 5G
- Evolution to 5G Core Networks: From Legacy Protocols to Modern Architectures based on APIs and the IP protocol.
- 5G SBIs: Service Based Interfaces - Benefits and Advantages
- 5G Innovations: Smart Network Exposure, Dynamic Network Management, Edge Computing Integration
- 5G Use Cases
- 5G Network Slicing: Paid Tiers, MVNO, Slices for custom needs

## OpenAPIs in Telecom

- Challenges with custom APIs: A lot of custom APIs lead to reduced innovation.
- OpenAPI - Introduction and History: One API standard to rule them all - finally a standard specification for APIs.
- OpenAPI – Structure: OpenAPI yaml file components: openapi, info, paths, responses, content, schema ...
- OpenAPI – Tools: An array of tools for designing, documenting, testing, validating and code generation of Open APIs.
- OpenAPI - Role and Benefits in Telecom Goals, Challenges and Benefits.
- OpenAPI - Use Cases in Telecom: Mobile Payments, IoT, Smart Cities, Network Slicing ...

- OpenAPI - Hands-on Exercises: Goal of the exercises: Implement an API using the OpenAPi specification from idea to implementation and runtime.

Tools covered: Swagger Editor, Swagger UI, Swagger Codegen, VSCode OpenAPI (Swagger) Editor, Postman

## TMForum's OpenAPIs

- TMForum - Introduction and History
- TMForum - Adoption and Members: A large number of telecom companies have adopted TMForums initiatives.
- TMForum – Initiatives: ODA, Open APIs, Business Process Framework, Information Framework
- ODA - Open Digital Architecture History, Goal and Components
- OpenAPI - History and Vision: Role of Open APIs in ODA and growth over time.
- OpenAPI - Features, Adoption and Benefits Standardisation, modularity, global reach.
- OpenAPI - Open API Dictionary: A single place for all TMForum's Open APIs.
- OpenAPI – Implementation: A compressed guide on phases for implementation of TMForums OpenAPIs. From planning to runtime and beyond.
- TMForum's OpenAPI - Hands-on Exercise: Goal: Explore the Open API dictionary. Mock implementation of one Open API from TMForum.

## GSMA's Open Gateway

- Open Gateway - Introduction and History: What is Open Gateway and its purpose? Brief history.
- Open Gateway - Features and Adoption: What are the key features, how is the adoption rate going so far?
- API List: Observe and discuss the full list of GSMA's Open Gateway APIs.

## CAMARA

- CAMARA - Introduction and History: What is CAMARA and who is involved in its development.
- Relationship between CAMARA, Open Gateway and TMForum's OpenAPI Close relations and collaborations between the 3 initiatives. Key differences.
- CAMARA - Release Cycle
- CAMARA - Stable APIs:Discussion of all CAMARA stable APIs.
    - Device Reachability Status API
    - Device Roaming Status API
    - Device Location API
    - Number Verification API
    - One-Time Password SMS API
    - QoS Profiles API
    - Quality on Demand API
    - Sim Swap API
    - Simple Edge Discovery API
- CAMARA APIs - Architecture
    - Authentication and authorisation
    - User Consent
    - 5G and 3GPP standards
    - Custom and legacy Telecom APIs
    - API Gateway
- CAMARA API - Hands-on Exercise: Goal: Analyse the CAMARA stable APIs. Mock implementation of one CAMARA stable API.

## ADUNA

- CAMARA - Challenges in Scaling: Why is CAMARA still not easy enough for developers.

- ADUNA – Overview: Why it matters, Who is behind it, Recent Milestones
- ADUNA - Benefits for CAMARA: What benefits do operators get from CAMARA + Aduna
- ADUNA – APIs: SimSwap and Number Verification. Operator Coverage.
- ADUNA - How to use it Vonage Integration Workflow