



**HCIP-5G-RNP&RNO**

# **Online Course**

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## Course Modules

### 1.5G Air Interface

- 5G Frequency Bands and Specifications
- 5G Air Interface Protocols
  - Uu Interface Protocols Overview
  - RRC Layer
  - SDAP Layer
  - PDCP Layer
  - RLC Layer
  - MAC Layer
  - PHY Layer
- 5G Air Interface Physical Layer
- Time-Frequency Resources of Physical Layer
- Physical Channels and Signals over the Air Interface

## 2.5G Protocols and Signaling Analysis

- 5G Network Protocols
  - 5G Network Architecture and NE Function
  - 5 Network Interface and Protocol Stack
  - Identifiers on 5G Networks
  - 5G Network Protocol Layer States
  - 5G QoS Architecture
- 5G Network Signaling and Analysis
  - 5G Network Basic Procedure Overview
  - NSA Initial Attach Procedure
  - SCG Addition Procedure
    - NSA Mobility Management Procedure
  - 5G SA networking relevant signaling flow
  - UE Registration Flow (SA)
  - UE PDU Session Establishment Flow (SA)
  - Service Request (SA)
  - RRC Status Transition Flow (SA)
  - Mobility Management (SA)
  - Voice Service
  - 5G Signaling Procedure Analysis Practice

## **3.5G Wireless Network Coverage and Capacity Estimation**

- 5G Wireless Network Coverage and Capacity Estimation
- 5G Network Planning Objectives and Process
- Link Budget for 5G Wireless Network Coverage
- Link Budget for NR FDD Wireless Coverage
- 5G Wireless Capacity Estimation

## **4.5G Radio Network Cell Parameters Design**

- 5G Radio Network Cell Parameters design
- 5G Massive MIMO Scenario-Based Beam Design
- 5G Timeslot Assignment Planning
- 5G PCI Design
- 5G PRACH Parameter Design
- 5G Cell Neighboring Cell Design
- 5G Radio Cell Power Design

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## **5.5G Radio Network Planning Simulation**

- 5G Radio Network Planning Simulation
- 5G radio network simulation principle introduction
- 5G radio network simulation operation demonstration
- 5G radio network simulation result analysis and demonstration



## 6.5G Radio Network Features

- 5G Radio Channel Management Feature
  - PDCCH Resource Management Algorithm
  - PUCCH Resource Management Algorithm
  - SRS resource management algorithm
  - Uplink timing algorithm
  - Random access algorithm
- 5G Power Control Feature
  - Cell reference power
  - Downlink channel power control
  - Uplink channel power control
- 5G Scheduling Feature
  - Scheduling resource units and basic principles
  - Downlink scheduling algorithm
  - Uplink scheduling algorithm
- 5G Mobility Management Feature
  - Background of 5G mobility management
  - NR mobility management architecture
  - Process and Principles of 5G mobility Management
  - 5G Mobility Management Parameters and Optimization

# HCIP-5G-RNP&RNO

- 5G Massive MIMO Key Technologies and Deployment
- Massive MIMO Overview
- Key Massive MIMO Technologies
  - Beam Management
  - High-Frequency Massive MIMO Beamforming
  - SU-MIMO
  - MU-MIMO
  - VMIMO
- Massive MIMO Planning and Deployment
- Beam Management Principles and Applications
  - Beam Management Overview
  - Basic Beam Management
  - 3D Beam Pattern
- 5G Feature Application and Parameter Optimization
  - Overview of Core 5G Wireless Performance Parameters
  - NSA 4G/5G Coordination-related Parameters and Optimization
  - Control-Plane Performance Parameters



## **7. Signaling Flows and Activation of 5G Voice Services**

- Signaling Flows and Activation of 5G Voice Services
  - Overview of 5G Voice Solutions
  - IMS Introduction
  - Voice Service Activation in SA Networking
  - EPS Fallback Case Study

## **8. Interoperability between E-UTRAN and NG-RAN**

- Interoperability between E-UTRAN and NG-RAN
  - Background and Technology Overview
  - Mobility Management for UEs in Idle Mode
  - Data Service Mobility Management for UEs in Connected Mode
  - Voice Service Mobility Management for UEs in Connected Mode
  - Multi-Operator Sharing

## **9. 5G Radio Network Performance Management**

- 5G Wireless Network Performance Management
  - Basic Concepts of 5G Counters
  - 5G KPI Description
- 5G KPI Problem Analysis
  - Overall Approach to KPI Problem Analysis
  - 5G Accessibility KPI Analysis
  - 5G Mobility KPI Problem Analysis
  - 5G Retain ability KPI Problem Analysis

## 10. 5G Radio Network Problem Analysis and Optimization

- 5G Radio Network Optimization and Problem analysis
  - 5G Radio Network Coverage Problem Analysis
  - 5G Radio Network Access problem Analysis
  - 5G Radio Network Handover problem Analysis
  - 5G Radio Network Calldrop problem Analysis
  - 5G Radio Network Data service problem analysis & Optimizatn
  - 5G Rank Troubleshooting
- 5G Radio Network Problem Handling Case study

## 11. 5G Use Cases and Business Model Exploration

- 5G Business Value and Development
  - 5G Business Development Forecast
  - Benefits brought by 5G to industries
- 5G Business Applications and Use Cases
  - eMBB Services and Business Applications
  - Smart Grid Services and Business Applications
  - IoV services and business applications
  - Smart manufacturing services and business applications
  - UAV services and business applications



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