Systems & Network Training

5G demystified

A 3 day training course

Save on expenses. This course is also available on your premises.

Description

This course is designed to give the delegate an understanding of the technologies and interworking requirements of the next generation of cellular communications.
It is not a definitive set of descriptions but a possibility of the final deployment. During the course we will investigate the 10 pillars for 5G, which will include various Radio Access Technologies that are required to interwork smoothly. Hence we will look at the 4G Pro features and other RATs.

Key outcomes

By the end of the course delegates will be able to:

- ✔ List the ten pillars of 5G deployment.
- ✔ Explain the 5G Internet and Software Distributed Networks (SDN).
- ✔ Explain carrier aggregation, the mobile cloud and RAT virtualisation.
- ✔ Explain an overall picture of 5G architecture.

Training approach

This structured course uses Instructor Led Training to provide the best possible learning experience. Small class sizes ensure students benefit from our engaging and interactive style of teaching with delegates encouraged to ask questions throughout the course. Quizzes follow each major section allowing checking of learning.

Details

Who will benefit?
Anyone who is looking to work with next generation networks.

Prerequisites
Mobile communications demystified.

Duration: 3 days

Customer rating: ★★★★★

Generic training	Small class sizes	Hands On training	Our courseware	Customise your course
Generic training compliments product specific courses covering the complete picture of all relevant devices including the protocols "on the wire".	We limit our maximum class size to 8 delegates; often we have less than this. This ensures optimal interactivity between delegates and instructor.	The majority of our courses use hands on sessions to reinforce the theory.	We write our own courses; courseware does not just consist of slides and our slides are diagrams not bullet point text.	Please contact us if you would like a course to be customised to meet your specific requirements. Have the course your way.
"*Friendly environment with expert teaching that teaches the why before the how.*" G.C. Fasthosts	*"Excellent course. The small class size was a great benefit..."* M.B. IBM	*"Not many courses have practice added to it. Normally just the theoretical stuff is covered."* J.W. Vodafone	*"Comprehensive materials that made the course easy to follow and will be used as a reference point."* V.B. Rockwell Collins	*"I was very impressed by the combination of practical and theory. Very informative. Friendly approachable environment, lots of hands on."* S.R. Qinetiq

5G demystified

Course content

Drivers for 5G
5G Road Map, 10 Pillars of 5G, evolving RATs, small cell, o SON, MTCm, mm-wave, backhaul, EE, new spectrum, spectrum sharing, RAN virtualisation.
4G LTE advanced features
*MIMO, Downlink & uplink MIMO R8, MIMO technology in LTE advanced, Downlink 8-layer SU-MIMO, Downlink MU-MIMO, Uplink MU-MIMO, Uplink transmit diversity, Coordinated multi-point operation (CoMP), Independent eNB & remote base station configurations, Downlink CoMP, * Uplink Multi-Cell Reception.
ICIC & eICIC
ICIC, Homogeneous to heterogeneous network, eICIC, Macro-pico scenario, Macro-femto scenario, Time orthogonal frequencies. Almost Blank Subframe (ABS).
Carrier aggregation
Component carriers (CC), * CC aggregation, Intra-band contiguous solutions, Intra-band non-contiguous solutions, Inter-band non-contiguous solutions, CA bandwidth classes, Aggregated transmission bandwidth configurations (ATBC), Possible carrier aggregation configurations (Rel 9, 10 & 12).
Enhanced Interference Mitigation & Traffic Adaptation (eIMTA)
TDD UL-DL reconfiguration for traffic adaptation, Reconfiguration mechanisms, Interference mitigation schemes, Dynamic & flexible resource allocation.
5G architectures
5G in Europe, horizon 2020 framework, 5G infrastructure PPP, METIS project, innovation centre, 5G in North America, research, company R & D, 5G specifications.
The 5G internet
Cloud services, IoT & context awareness, network reconfiguration & virtualization support, hypervisors, SDN, the controller, service-oriented API, OpenFlow switches, SDN operation, SDN control for traffic flow redirection, OpenFlow controllers, how SDN works, application, control and infrastructure layers, a programmable network, how SDN & NFV tie together, SDN's downside, SDN orchestration, Mobility, architectures for distributed mobility management, MEDIEVAL & MEDIVO projects, a clean slate approach, mobility first architecture, network virtualization (VNet), INM, NetInf, ForMux, MEEM, GP & AM, QoS support, network resource provisioning, IntServ, RSVP, DiffServ, CoS, aggregated resource provisioning, SICAP, MARA, Emerging approach for resource over-provisioning, example use case architecture for the 5G internet, integrating SDN/NFV for efficient resource control, control information repository, service admission control policies, network resource provisioning, control enforcement functions, network configurations, network operations.
Small cells for 5G
Average spectral efficiency evolution, What are small cells? WiFi & Femto cells as candidate small-cell technologies, Capacity limits & achievable gains with densifications, gains with multi-antenna techniques, gains with small cells, Mobile data demand, approach & methodology, subscriber density projections, traffic demand projections, global mobile data traffic increase modelling, country level backhaul traffic projections, 2020 average spectrum requirement, Small cell challenges, backhaul, spectrum, automation.
Cooperation for next generation wireless networks
Cooperative diversity & relaying strategies, Cooperative ARQ & MAC protocols, NCCARQ & PRCSMA packet exchange, Physical layer impact on MAC protocol, NCCARQ overview, PHY layer impact, Performance evaluation, simulation scenario and results.
Mobile clouds; technology & services for future communications platforms
Mobile cloud, software, hardware and networking resources, Mobile cloud enablers, mobile user domain, wireless technologies, WWAN WLAN and WPAN range, Bluetooth, IEEE.802.15.4, software stacks, infrared, near field communications (NFC), store & forward vs compute & forward, random/linear network coding.
Security for 5G communications
Potential 5G architectures, Security issues & challenges in 5G, user equipment, mobile malware attacks, 5G mobile botnets, attacks on 4G networks, C-RNTI & packet sequence numbers based UE location tracking, false buffer status reports attacks, message insertion attacks, HeNB attacks, physical attacks, attacks on mobile operator's network, user data & identity attacks, DDoS attacks, amplification, HSS saturation, external IP networks.