Systems & Network Training

Essential 5G

A 3 day training course

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

Description

This course is designed to give delegates an explanation 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. we will investigate the 10 pillars for 5G which will include various Radio Access Technologies that are required to interwork smoothly. 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.
- ✔ Describe the 5G Internet.
- ✔ Explain virtualization and RAT virtualization.
- ✔ Describe Software Defined Networks (SDN).
- ✔ Explain carrier aggregation.
- ✔ Describe the mobile cloud.
- ✔ 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 looking for an understanding of the technologies and interworking requirements of the next generation of cellular communications.

Prerequisites
None.

Duration: 3 days

Overall 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

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Course content

Drivers for 5G

5G Road Map, 10 Pillars of 5G, evolving RATs, oSON, MTCm, mm-wave, backhaul, EE, new spectrum, spectrum sharing, RAN virtualisation.

4G LTE Advanced

MIMO technology in release 8, 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.

ICIC & eICIC

ICIC, Homogeneous to heterogeneous network evolution, Introduction to eICIC, Macro-pico scenario, Macro-femto scenario, Time orthogonal frequencies. Almost Blank Subframe (ABS).

Carrier aggregation

Component carriers (CC), CC aggregation deployments, 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 configs.

eIMTA

TDD UL-DL reconfig. for traffic adaptation, Reconfig. mechanisms, Interference mitigation schemes, Dynamic & flexible resource allocation.

5G architectures

5G in Europe, horizon 2020 framework, 5G infrastructure PPP, METIS project, 5G in North America, academy research, company R&D, 5G specifications.

The 5G internet

High-level view of Cloud Services, The Internet of Things & context awareness, Network reconfiguration & virtualization support, server proliferation, how VMs fix underutilised server problem, enter the hypervisor, why are VM such a big deal?

SDN, evolution of the data centre network, high availability, low latency, scalability, security, cost model explodes, service-oriented API.

OpenFlow switches, OpenFlow controllers, how SDN works.

The big picture, pulling it all together, why the network had to change, how SDN & NFV tie together. Evolutionary approach to the internet, architectures for distributed mobility management, MEDIEVAL & MEDIVO projects, a clean slate approach, mobility first architecture. VNet, INM, NetInf, ForMux, MEEM.

Generic Path (GP) & anchorless mobility (AM), Quality of Service support, network resource provisioning, resourcing inside a network. IntServ, RSVP, DiffServ, CoS.

Emerging approach for resource over-provisioning, example use case architecture for scalable resource control scenarios in the 5G internet.

Integrating SDN/NFV for efficient resource over-reservation control, control information repository, service admission control policies, network resource provisioning, control enforcement functions, network configurations & operations.

Small cells for 5G

Average spectral efficiency evolution, WiFi & Femto cells, Capacity limits.

Achievable gains with densifications, multi-antenna techniques, small cells.

Mobile data demand, approach & methodology, subscriber density and traffic demand projections to 2020. Demand versus capacity, global mobile data traffic increase modelling, country level backhaul traffic projections, Small cell challenges, backhaul, spectrum, automation.

Cooperation for next gen wireless networks

Diversity & relaying strategies, cooperation & network coding, ARQ & MAC protocols, NCCARQ & PRCSMA packet exchange, Physical layer impact on MAC protocol analysis, NCCARQ overview, PHY layer impact, Case study on NCCARQ.

Mobile clouds

Mobile cloud, 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). Network coding, store & forward vs compute & forward, linear network coding, random linear coding.

Security for 5G communications

Potential 5G communication systems architectures, Security issues & challenges. Mobile malware attacks targeting the UE, 5G mobile botnets, access networks, attacks on 4G networks, C-RNTI & packet sequence number based UE location tracking, false buffer status reports attacks, message insertion attacks, HeNB attacks, physical attacks, credential attacks, configuration and protocol attacks, attacks on MON, user data & identity attacks, mobile operator's core network, DDoS attacks targeting MON, signalling amplification, HSS saturation, external IP networks.