Networks and the future of Internet

Seminar of 3 days - 21h
Ref.: RNG - Price 2025: 2 950 (excl. taxes)

THE PROGRAMME

last updated: 03/2024

1) Internet and the upcoming generation of protocols
- The Internet Society. Standardization.
- The main features of IP : addressing, routing (BGP, RIP, OSPF)...Issues and solutions.
- Local networks/Public networks : NAT/PAT. IPv6.
- The transport layer in TCP/IP : UDP, TCP.

2) Mobility in networks
- The first generation of mobile networks.
- GSM and its breakthroughs. Packet mode in GSM networks : GPRS/EDGE. GPRS networks routing.
- 3G : UMTS, CDMA2000 ; architecture, throuputs, applications. Evolutions to 3G/3G+ : HSDPA, HSUPA, HSOPA, MIMO.
- Next generations : throughputs, caracteristics (LTE and UMB).
- Inter-netwoks mobility : vertical handover and cognitive radio.
- IP mobile architecture in heteregeneous networks.

3) Prospective for the mobile Internet
- Mobility, UMTS, 4G and wireless routers.
- Contrôle. Content Distributed Networks. Signaling. Control.
- Quality of Service for fixed and mobile networks.

4) Evolution of the technologies in the access networks
- Switching : high throughputs, label and contents.
- Content-based routing and XML routing.
- Overlays networks, CDN and P2P networks.
- Services-based architectures.

5) Controling the Quality of service (QoS)
- Definition of the QoS : from design to state machines.
- Traffic engineering. Source-to-destination boundaries.
- Access control. Packets sequencing.
- Queues handling : RED, RIO.
- QoS reults for different technologies.
- Application-based trafic shaping. The RTP/RTCP proposition.

6) Technologies and evolutions of the access networks
- ATM, a possible universal network ?
- ATM for ISP and telcos.
- Data control and services classifications.
- Ethernet-for-all !
- From 10Mbits/s to 10Gbits/s.
- From LAN to long-distance core network. 802.17. Ethernet First Mile for FTTH.
- IP for a new generation.

- IPv4 and IPv6. Advantages of IPv6 for fast networks and multimedia.
- IP multicast routing. IntServ and DiffServ models.
- Different class of services : EF, AF and BE.
- DiffServ and MPLS. DiffServ and IntServ : differences.
- MPLS and the new generation of core networks for Internet.
- Label switching. Origins and reasons.
- LDP Protocols , CR-LDP, RSVP-TE, G-MPLS for new generation.
- MPS vs IP. Déployments and key players.

7) Local lopp
- Optical fibers access networks (FTTC, FTTH).
- Cable-TV access networks. Cable-TV modems.
- Twisted pairs access networks. DSL modems. Throughputs. Other solutions : xDSL, DSLAM.
- Upcoming triple-play and quadruple-play.
- Architectures. Home networking : The Wi-Fi and PLC (PowerLine Communications) technologies.

8) Wireless networks
- WPAN networks
- Newer generations and the 802.15 standard.
- UWB (Ultra Wide Band) and the very high troughput.
- Bluetooth 3.0, WUSB products and WINET. ZigBee.
- WLAN networks.
- WiFi environment with IEEE 802.11a/b/g/n.
- Handovers, Quality of service and security.
- Fast handover and mesh-networks.
- WMAN networks.
- WiMAX. Metropolitan networks and IEEE 802.16. WDSL, mobile ADSL and IEEE 802.16e.
- WRAN networks.
- Usage of the UHF/VHF bands for wireless regional networks and IEEE 802.22. Smart antennas and cognitive radio.
- Wi-xx solutions for networks.
- Wireless networks and IEEE 802.21.
- Wi-xx networks vs 4G.

9) Voice over IP
- Convergence.
- Voice over IP, ToIP and VoIP.
- Towards a full-IP telephony network.
- Standards, industrial key players.
- H323 : close the original PSTN.
- Architecture and deployment using compatible signalling with PSTN.
- SIP approach and unified communications.
- An open-system of signalization to build-up services. The SIP Forum. SIP within a 3G mobile network.
- Comparison of SIP and H323.
- MGCP and gatekeepers.
- Interconnexion of ToIP and PSTN devices. Integration of heterogeneous services.

10) Security and the next generation of Internet
- Internet security model : still avalailable ? Authentication, RADIUS and IEEE 802.1x.
- Encryption and electronic signature.
- Data Classification for security usage.
- New generation of firewalls. Authentication with chips.
- Certificates architectures (PKI).

- Autonomous networks. Networks managment. Smart networks. Virtual networks. After IP.

DATES

REMOTE CLASS
2025 : 23 sept.