

	Des Réseaux Couches Bases aux Protocoles Internet	CM 12h	TD 42h	HNE 12h
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Cours proposé en : SI4

Responsable : LOPEZ PACHEZCO Dino (dino.lopez@univ-cotedazur.fr)

Résumé :

This lecture is composed of three main parts to provide a wide view of the network protocol and administration.

First, we focus mainly on the lower layers of the protocol stack and current trends in IP-based networks. More specifically, we introduce the Layer 2 protocols (Ethernet and Wi-Fi). Then, we introduce the challenges of congestion control on the Internet and the future trends, as well as the importance, advantages, and disadvantages of network virtualization and middleboxes (e.g. NATs).

Since Web-based approaches are among the most popular for distributed software applications, the second part introduces the HTTP protocol and its various features. The focus is on the administrative data of the protocol and the main data formats that are supported.

Finally, we provide a quick introduction to network security. After explaining the principle of attacks at various layers, we introduce classical network security architectures like firewall-protected corporate networks or VPNs. We finally conclude with a presentation of Internet cryptographic protocols and security infrastructures.

Prérequis :

Good knowledge of the CLI and management of Linux systems, IPv4 addressing, routing and layer 2 retransmission. Students must be familiar with networking tools, such as ping, iperf, wireshark, tcpdump. Good knowledge of the most popular networking applications (DNS, DHCP, SSH, SMTP, HTTP, ...).

Objectifs :

The student must be aware of the impact that the medium access protocols and congestion might have on the performance of distributed applications. Also, they must understand the complexity that applications will face on the Internet due to the large variety of networking services and network virtualization techniques. Finally, they should be aware of the network security threats they have to address when designing and developing distributed applications.

Contenu :

- The IEEE 802.3 protocol and STP
- The IEEE 802.11 protocol
- Congestion control protocols
- Introduction to Network Function Virtualization (NFV)
- Middleboxes and NATs
- Socket programming
- HTTP and web sockets
- Network attacks on Internet protocols and their analysis
- Firewalls and VPNs
- Internet Security Infrastructures and Cryptographic Protocols (PKIs, key distribution, DNSSEC ...)

Références :

- Computer Networking - James Kurose, Keith Ross. Pearson
- "802.11 Wireless Networks – The definitive guide" - Matthew S. Gast. O'Reilly.

Acquis :

Evaluation :

- Mini QCMs all along the sessions
- written exams