

## New IP Architectures and Mobility

### General Information

#### Number of ECTS Credits

3

#### Module code

TSM\_NewIPArc

#### Valid for academic year

2020-2021 DRAFT

#### Last modification

2020-01-31

#### Responsible of module

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#### Explanations regarding the language definitions for each location:

- Instruction is given in the language defined below for each location/each time the module is held.
- Documentation is available in the languages defined below. Where documents are in several languages, the percentage distribution is shown (100% = all the documentation).
- The examination is available 100% in the languages shown for each location/each time it is held.

	Berne	Lausanne	Lugano	Zurich
<b>Instruction</b>		X E 100%		
<b>Documentation</b>		X F 10% X E 90%		
<b>Examination</b>		X F 100% X E 100%		

#### Module Category

TSM Technical scientific module

#### Lessons

2 lecture periods and 1 tutorial period per week

### Entry level competences

#### Prerequisites, previous knowledge

Internet protocols  
Basic concepts of networking protocols.

### Brief course description of module objectives and content

The new trend in multimedia and communication requires new paradigms in terms of both mobility and security. This module gives an overview of the classical network architectures, the new techniques which took advantage of the latest findings in terms of technologies and algorithms.

The module will present the latest technologies and the scientific background to the main topics like:

- Mobility and virtualization of IP networks
- Self organizing networks
- Next Generation Networks

Presentation of real, representative infrastructures offering high complexity, performances and service level.

## Aims, content, methods

### Learning objectives and acquired competencies

At the end of this module, the student has the following knowledge:

- the new architectures and trends in the IP networks
- ability to describe the main features of each of these architectures and to compare them with each other
- characteristics of mobility systems and their impact on networking architectures
- ability to participate in the planning, development and operation of innovative networking infrastructures.

### Contents of module with emphasis on teaching content

#### Mobility and virtualization in the IP networks (about 30%)

Mobility in the IP networks: Mobility / IP mobility issues in a cellular network / Mobility at IP / MIP (Mobile IP) / Mobility with IPv6 level

Virtualization of IP networks: VPN (Virtual Private Network) / MPLS (Multi-Protocol Label Switching) / Remote Access / AAA (Authentication, Authorization, Accounting).

Traffic planning and quality of service in the IP networks,  
Data transport protocols and security.

#### Self-organized networks (about 20%)

P2P networks

Localization techniques

authentication,

Applications and Examples of Networks (SDN - Software Defined Network, Cloud, etc.).

#### Next generation IP networks and IP access technologies (NGN: Next Generation Networks) (approximately 50%)

Architecture IMS / TISpan,

Control and transport protocols for multimedia,

Public and private identities, reception, authentication,

General mobility: roaming and relocation,

Network and application security,

IP access and backhaul.

5G networking and IoT systems.

### Teaching and learning methods

Lectures

Guided exercises

Case studies

### Literature

- Réseaux IP de prochaine génération – NGN, IMS, TISpan, A. Delley, ISBN 978-2-940156-34-4
- Technik der IP-Netze, A. Badach, E. Hoffmann, ISBN-13: 978-3-446-21935-9
- IP Multicast, Volume II: Advanced Multicast Concepts and Large-Scale Multicast Design (Networking Technology), by Josh Loveless, Ray Blair, Arvind Durai
- Internet of Things (IoT) in 5G Mobile Technologies (Modeling and Optimization in Science and Technologies), by C. Mavromoustakis, G. Mstorakis, J. Mongay Batalla

## Assessment

### Certification requirements

Module uses certification requirements

### Certification requirements for final examinations (conditions for attestation)

Essential contributions to the solution of exercises and case studies.

### Basic principle for exams

**As a rule, all the standard final exams for modules and also all repetition exams are to be in written form**

**Standard final exam for a module and written repetition exam**

**Kind of exam**

written

**Duration of exam**

120 minutes

**Permissible aids**

No aids permitted

**Special case: Repetition exam as oral exam**

**Kind of exam**

oral

**Duration of exam**

30 minutes

**Permissible aids**

No aids permitted