EMERGING NETWORKS

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Descriptive Part

The "Emerging Networks" course represents an in-depth exploration of the new network architectures that are currently transforming the telecommunications landscape. The teaching is mainly structured around Software Defined Networking (SDN) and Network Function Virtualization (NFV), two paradigms that are revolutionizing the design and management of networks. SDN offers an innovative approach by separating the control plane from the data plane, thus enabling centralized and programmable management of the network. This separation offers unprecedented flexibility in the configuration and optimization of network infrastructures. In parallel, NFV transforms network functions traditionally implemented in specialized hardware into virtualized software components, bringing new agility in the deployment of network services.

Technical Part

The hands-on sessions provided a concrete immersion into these emerging technologies. The manipulation of OpenFlow through Open vSwitch allowed to understand concretely how an SDN network works. The hands-on work started with the creation and configuration of virtual switches, followed by the implementation of flow rules to control the network behavior. The most interesting aspect was the implementation of an authentication system for devices and the dynamic configuration of forwarding rules. These hands-on exercises demonstrated how network programmability can meet specific needs such as quality of service management or flow security. The pedagogical progression, going from simple concepts to more complex configurations, allowed for a deep understanding of the underlying mechanisms.

Analysis Part

The emergence of programmable networks represents a fundamental evolution in the field of telecommunications. This transformation addresses the limits of traditional architectures in the face of increasing demands in terms of flexibility, performance and automation. The virtualization of network functions, combined with the programmability offered by SDN, allows us to completely rethink the way we design and manage communication infrastructures. The application of these concepts in areas such as the Internet of Things or edge computing demonstrates their relevance in meeting current challenges. The ability to rapidly deploy new services, optimize resource use and automate network management represents a considerable advantage for operators and companies. This evolution also paves the way for new business models and innovations in the provision of network services. The technical and organizational challenges remain numerous, particularly in terms of security and scalability, but the potential benefits fully justify the growing adoption of these technologies in the industry.

This course thus offers a complete and balanced vision of the issues and technical solutions that shape the future of communication networks