



SENDATE-Secure DCI

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Project Websites

www.celticplus.eu/project-sendate-secure-dci

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SENDATE-Secure-DCI

Within the SENDATE Secure-DCI project, an architecture for next-generation distributed data centers based on optical technologies in conjunction with virtualized network functions and software defined network orchestration will be developed allowing a flexible and secure provisioning of compute, storage and networking resources to tenants and applications at scale.

Main focus

Large Data Centers (DCs) are forming the most important control centers for communication and cloud-based services on the Internet. Within DCs, business as well as private data is stored, processed, and forwarded.

Although current DCs have a huge computing power, massive storage capacities, and an enormous performance based on centrally stored data, they are located far away from the customer, use the network only for transport, and are mostly owned by non-European companies. This leads to low flexibility, long delays to customers, and security concerns.

New application scenarios in our digital society such as Industrial Internet, mobile connected objects, Internet of Things, health applications, and especially 5G lead to a huge number of end devices and an enormous increase of traffic volume. The high demands on security, location awareness, service guarantees, flexibility, and latency require a convergence of telecommunication networks and IT as well as distributed data centers, which are placed close to the customers. The forthcoming integration of many smaller distributed data centers into a flexible, powerful ensemble represents an ideal network infrastructure to solve today's problems with latency, the data traffic volume and data sovereignty.

Approach

Within the SENDATE Secure-DCI project, the architecture for next-generation distributed data centers will be developed allowing a flexible and secure provisioning of compute, storage and networking resources to tenants and applications at scale. Innovative approaches such as Network Functions Virtualization (NFV) in



Secure interconnection of distributed data centers (Quelle: Shutterstock / ADVA)

combination with Software Defined Networking (SDN) are the basis for a secure, flexible, low-latency, and locality-aware distributed data center approach to support the upcoming application scenarios. Targets of the project are:

- ◆ Development of a novel, packet-optical distributed data center fabric architecture facilitating a 10-fold higher fabric capacity, 50% better network efficiency and 30% lower energy consumption than to-day's implementations.
- ◆ Integration and extension of open-source based control and orchestration software for distributed compute, storage and networking resources, allowing an application driven resource optimization with sub-second response times
- ◆ Development of a new multi-layer data center switch as elementary fabric building block providing a hardware-based layer 0 to layer 4 forwarding plane and embedded storage and compute capabilities to host software-based virtual network functions
- ◆ Development of new transmission schemes and optical interface technologies supporting WDM based intra-data center connectivity, metro-scale inter-

data center interconnects, and long-haul inter-data center connectivity at 400 Gb/s+ channel speeds allowing up to a 10-fold increase in fiber capacity while lowering power and maintaining reach.

- ◆ Development of an integral security concept ensuring that user and application data is only accessible in clear text within verifiably trusted areas and encrypted, preferably by post-quantum secure encryption methods, anywhere else.

Main results

The innovative architecture for extremely fast and flexible connection and networking of distributed data centers based on Industry-4.0 applications is created.

Encrypting transmission data on the physical layer ensures confidentiality of all data, independent of any higher layer protocol. In combination with quantum safe encryption a higher level of security is introduced and allows for innovative applications in sensitive areas such as telemedicine.

The defined architecture, control mechanisms, switching and transport technology, and security concepts are demonstrated in a field trial.

Impact

The work in the project SENDATE-Secure DCI allows the German and European IT and telecommunications industry to gain more market share with new network solutions and IT services in a market currently dominated by a few non-European operators.

About Celtic-Plus

Celtic-Plus is an industry-driven European research initiative to define, perform and finance through public and private funding common research projects in the area of telecommunications, new media, future Internet, and applications & services focusing on a new „Smart Connected World“ paradigm. Celtic-Plus is a EUREKA ICT cluster and belongs to the inter-governmental EUREKA network. Celtic-Plus is open to any type of company covering the Celtic-Plus research areas, large industry as well as small companies

or universities and research organisations. Even companies outside the EUREKA countries may get some possibilities to join a Celtic-Plus project under certain conditions.

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