



## ***Converged Heterogeneous Advanced 5G Cloud-RAN Architecture for Intelligent and Secure Media Access***

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## **Deliverable D3.5**

### **Final 5G V-Security Prototype**

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Deliverable leader: Fundacio i2CAT

#### Dissemination Level

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- |                                     |   |
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# Executive Summary

This document reports the final 5G v-security prototype. The 5G v-security prototype includes the dynamic orchestrator (integrated within the CHARISMA CMO), the virtualised security functions (vFW and vIDS) and the content caching and traffic handling solution deployed in the NCSR D testbed in Athens.

# 1. Introduction

The CHARISMA 5G v-security solution targets to demonstrate how a leased network slice in a 5G network could benefit from NFV based virtual security functions along with automated security management features. The VSFs (vFW and vIDS), NFV Orchestrator, the Security Policy Manager (SPM) and Monitoring & Analytics, described in detail in D3.4 [1], form the CHARISMA v-security solution. The abovementioned modules are developed and extended as components of the CHARISMA CMO.

The CHARISMA content caching and traffic handling solution, described in detail in D3.4, is realized as a NFV-based network service provisioned through the NFV orchestrator over a particular slice. The network slicing feature in CHARISMA CMO is achieved through the Open Access Manager, described in detail in D3.4, which is tightly knitted with the rest of the component to enable isolated network slices for different VNOs for provisioning of security or caching service.

The development of CHARISMA CMO (for details on CHARISMA CMO, please refer to D3.4) is successfully completed and verified by deployment in the NCSR D testbed. The development was carried out in incremental phases with module dependencies in mind. During the development of CMO modules functional tests were conducted per module to ensure desired functionality. In addition, module integration tests were designed and done to ensure inter-module working. The caching (vCC and vCache) and security services (vFW, vIDS) were provisioned on the testbed via CHARISMA GUI to validate the final prototype.

This report provides some screen shots after the deployment of the security and caching service in the NCSR D testbed as part of final prototype validation.

## 2. Final 5G V-Security Prototype

As a reminder, the logical architecture of the CMO is shown in Figure 1.

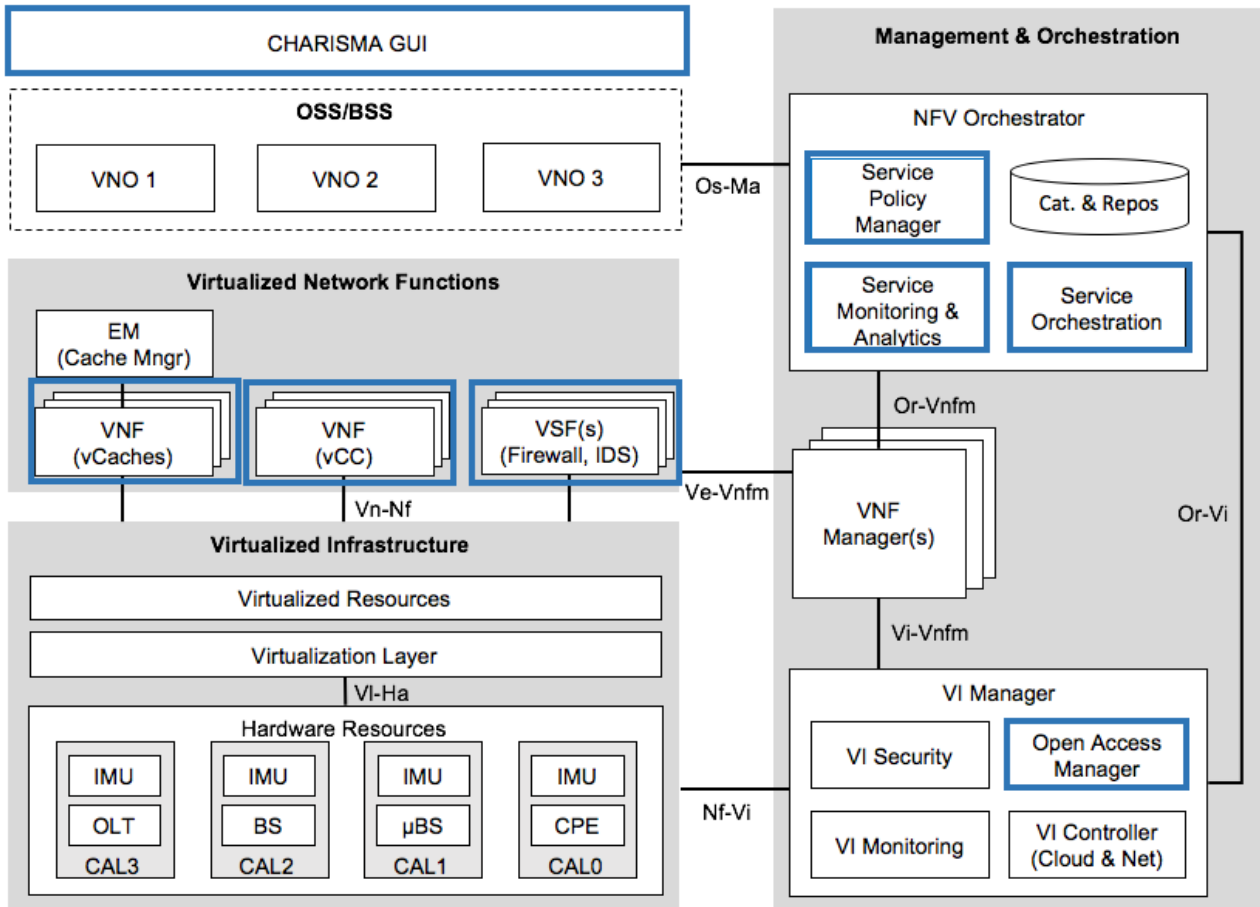


Figure 1: CHARISMA CMO platform and individual components

### 2.1. CHARISMA V-Security and Content Caching Solution

As mentioned earlier, the CHARISMA V-Security is achieved through CHARISMA GUI, VSFs, SPM and M&A. This section provides some screen shots from the final prototype.



Figure 2 CHARISMA GUI access page

The Infrastructure Provider mode provides management of physical, virtual network slices, and network services.

The image shows the CHARISMA Dashboard in Infrastructure Provider mode. The dashboard has a left sidebar with navigation options: Dashboard, Resource management, Policies, OpenAccess, Monitoring & Analytics, Catalogue, Running services, and Operation. The main content area is titled 'Dashboard > Information Overview' and features five summary cards: Physical networks (10), Virtual networks (15), VN operators (5), Resources (39), and Users (5). Below these cards are two tables. The first table is titled 'Physical networks' and has columns for 'Created at', 'Id', and 'Number of resources'. The second table is titled 'Virtual Network operator' and has columns for 'Id', 'Name', 'Description', and 'Number of virtual slices'.

Created at	Id	Number of resources
2017-10-11 15:38:57	59de1ef1668924c1b72000000	4
2017-10-11 17:21:58	59de3716668924c1b72000005	4
2017-10-13 12:18:49	59e0920968924c6d68000000	7
2017-10-17 10:34:50	59e5c8a968924c6d68000006	1
2017-10-25 15:10:21	59f08d3d68924c6d6800003b	6
2017-10-26 17:10:46	59f1fa1f668924c6d68000043	7
2017-10-30 11:14:05	59f67b6d68924c6d68000049	6
2017-10-30 11:23:21	59f6f89968924c6d6800004a	0
2017-10-30 15:40:05	59f739c568924c6d68000050	5
2017-10-30 15:51:33	59f73c7568924c6d68000056	5

Id	Name	Description	Number of virtual slices
59de222368924c2630ca9967	demoA	demoA desc	15
59e8973408924c67a98c82a1	demokritos	demokritos desc	15
59f893ab08924c096630c7bb	oam-utils-vno	VNO created by the oam-utils script	15

Figure 3 CHARISMA Dashboard (Infrastructure Provider mode)

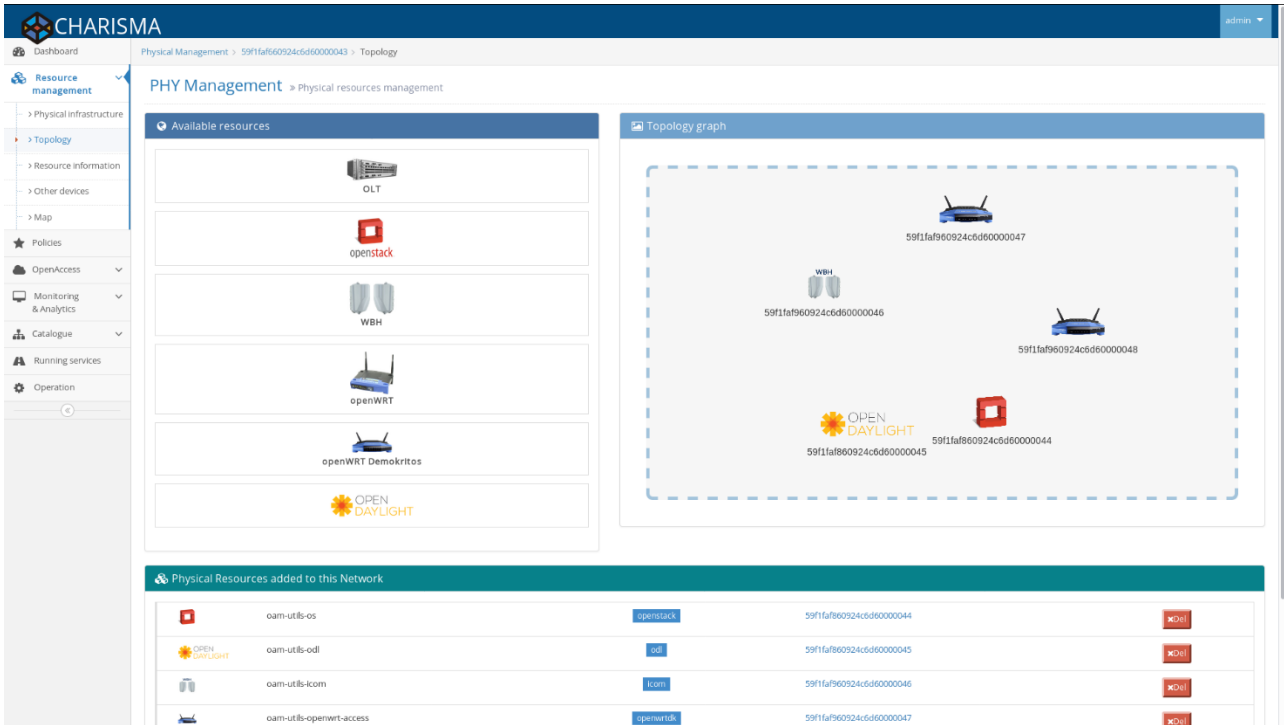


Figure 4 Resource Management at NCSR D testbed via CHARISMA Dashboard (Infrastructure mode)

From the Infrastructure Provider mode, the VSFs and Network Services are on boarded to the CHARISMA CMO.

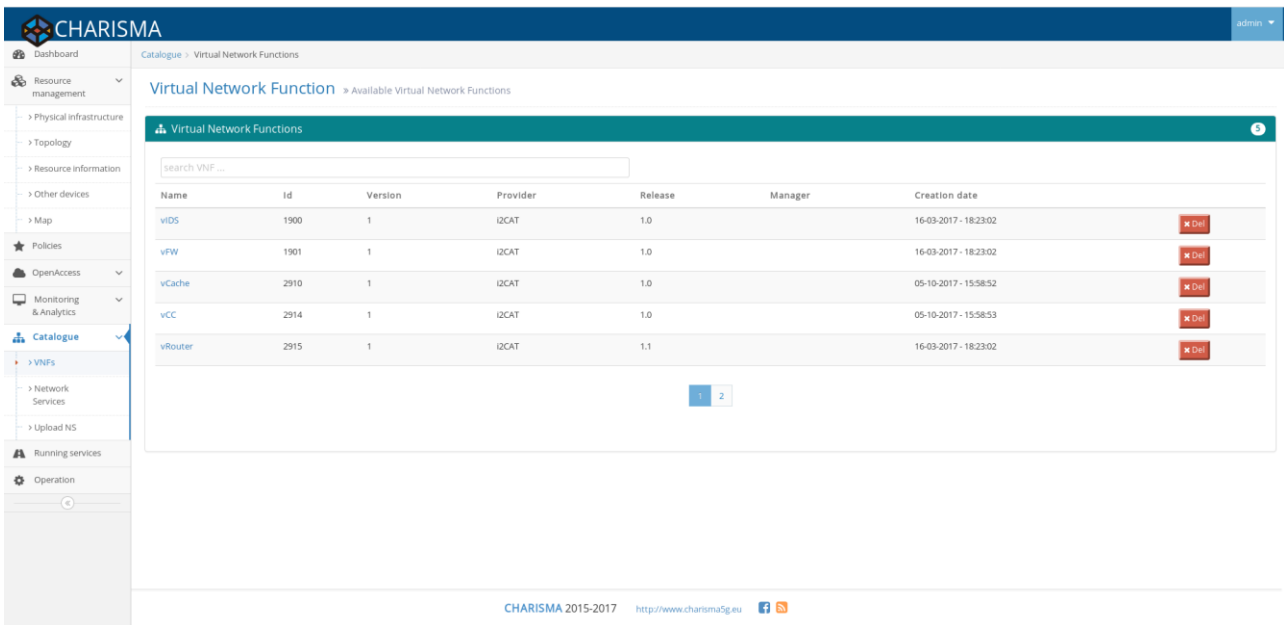


Figure 5 On boarded VSFs and VNFs in CHARISMA CMO

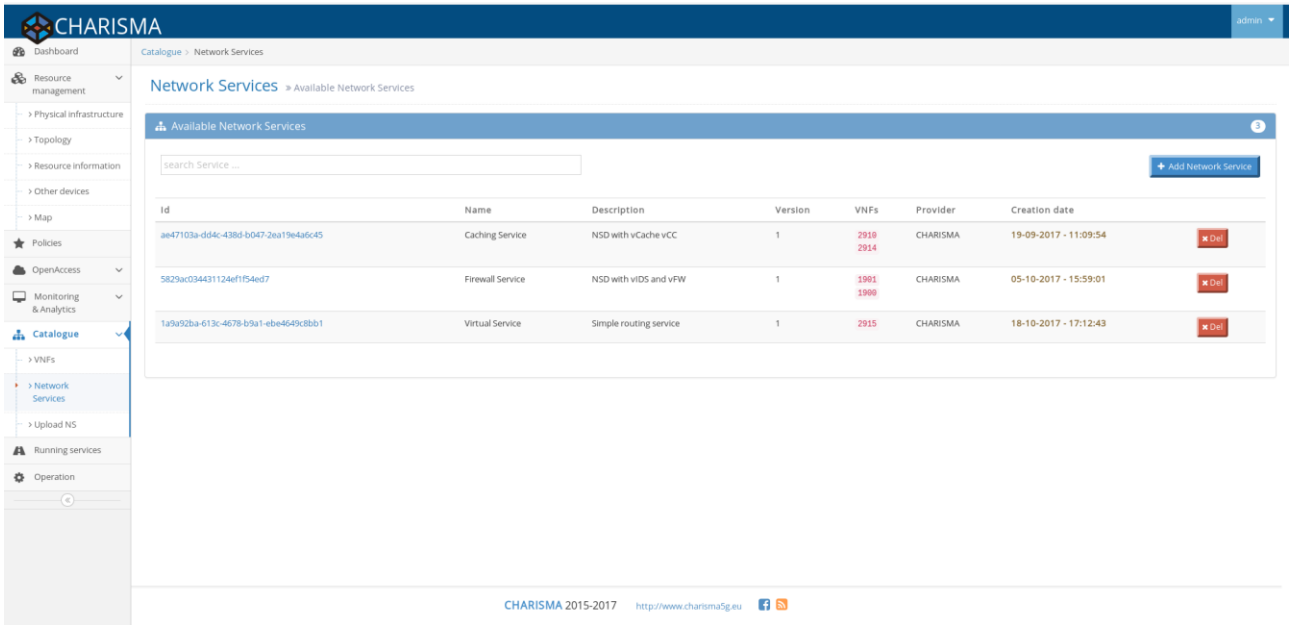


Figure 6 On boarded Network Services in CHARISMA CMO

Once the VNO has been created by the Infrastructure Provider and a network slice is assigned to it, the VNO can access its network via the CHARISMA GUI access page using its credentials.

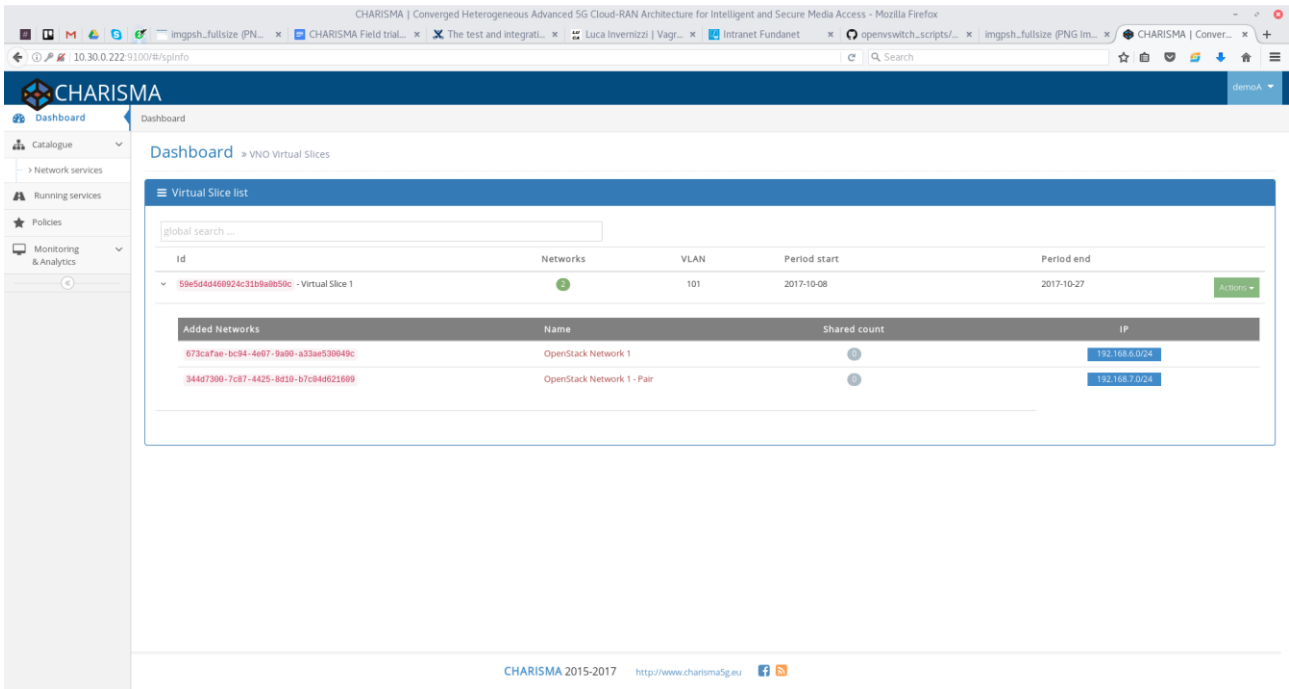


Figure 7 CHARISMA Dashboard (VNO mode)

The above screen shot shows a VNO with one assigned network slice. The network slice has two virtual networks attached to it. The configuration of the network slice is performed by the Infrastructure Provider. The complete detail of this process is available in D3.4.

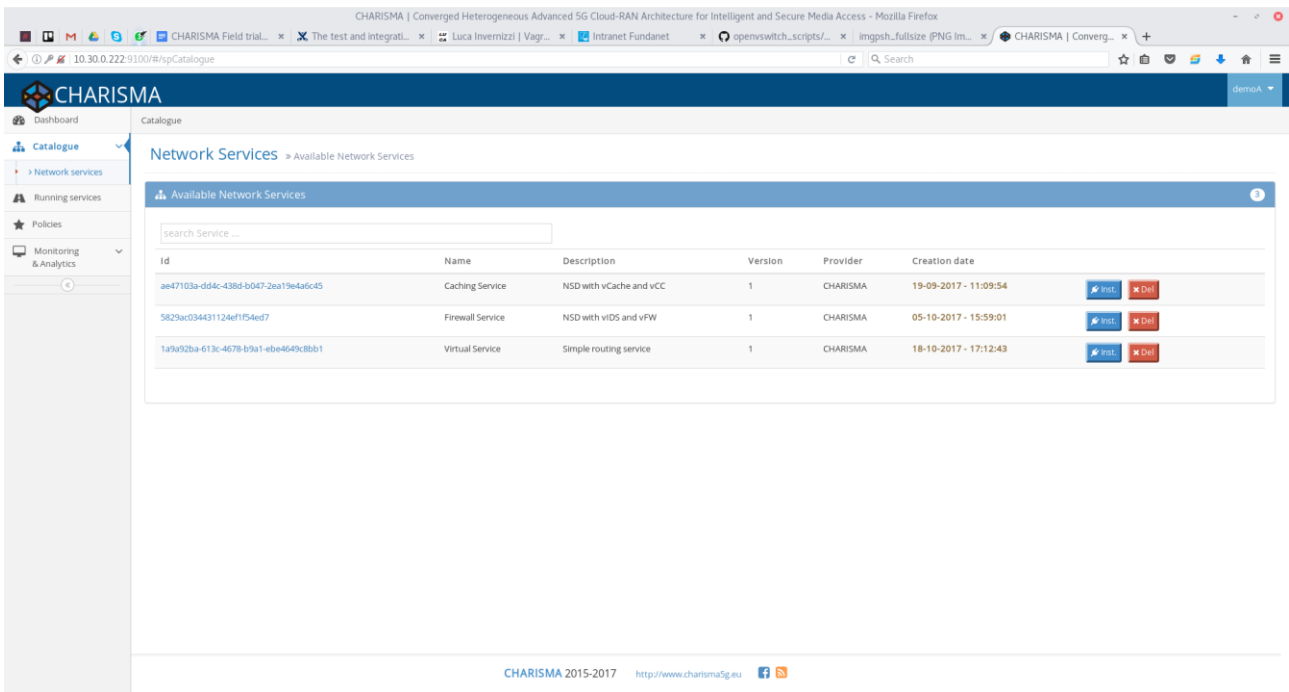


Figure 8 Network Services available to the VNO

The VNO can instantiate the available services in its network slice using the instantiate button. The above screen shot shows the on boarded Caching and Firewall services.

### 3.Live Demos in Events

The CHARISMA CMO has been demonstrated live in May 2017 at TNC 2017 and in June 2017 in EuCNC 2017.

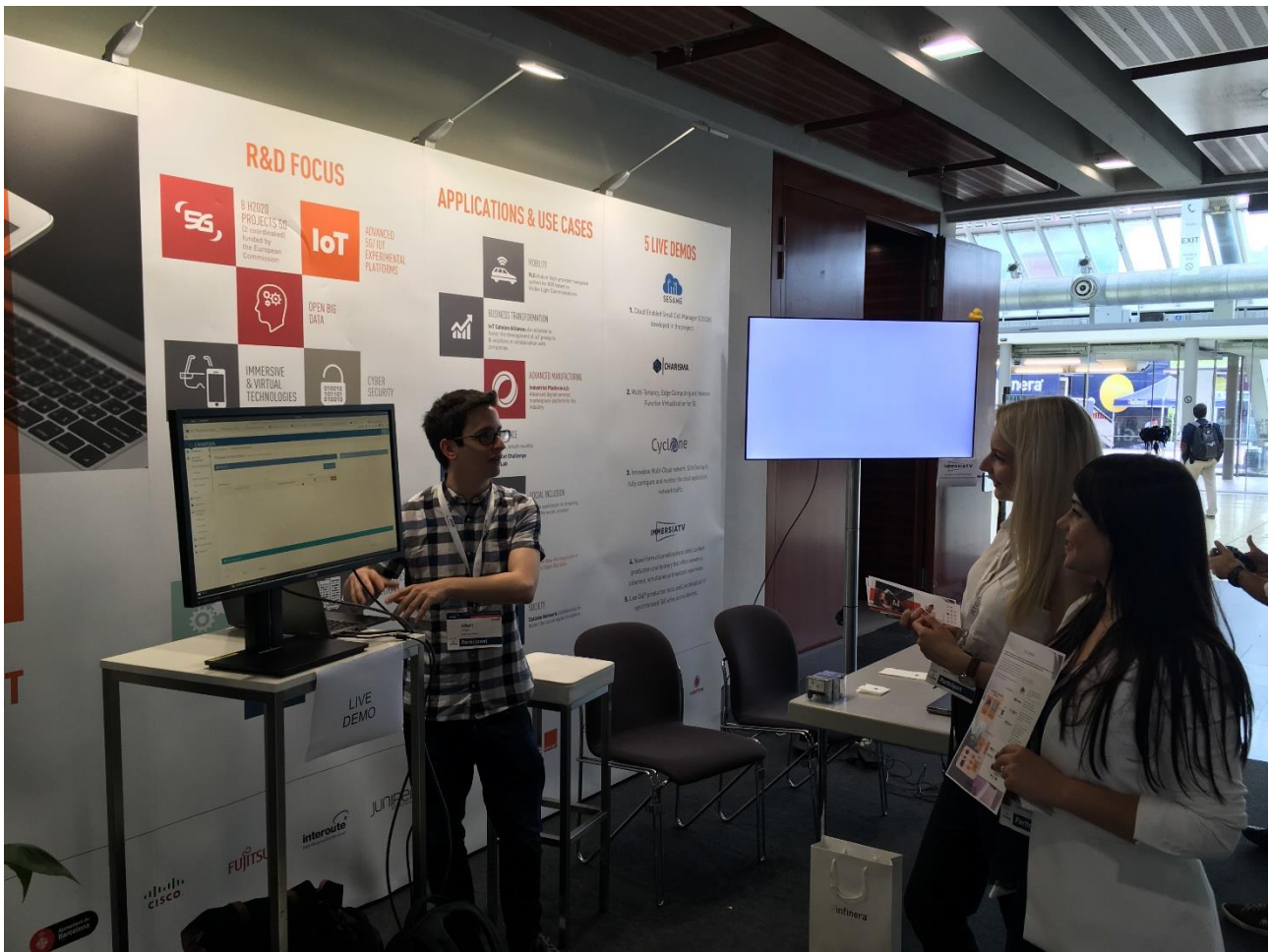


Figure 9 CHARISMA CMO live demo at TNC 2017 (Linz, Austria)



Figure 10 CHARISMA CMO Live Demo setup at EuCNC 2017 (Oulu, Finland)

## 4. Conclusions

This document reports the successful completion of the Final 5G v-security prototype. The development of CHARISMA CMO was incrementally achieved and deployed in the NCSR D testbed infrastructure. The document provides few screen shots from the final prototype at NCSR D testbed. The detail description and workflow of CHARISMA CMO, covering multi-tenancy, security and content caching features, has already been reported in D3.4.

# References

- [1] D3.4 Intelligence-driven v-security including content caching and traffic handling

## Acronyms

CMO	Control, Management, and Orchestration
GUI	Graphical User Interface
NFV	Network Function Virtualization
VNF	Virtual Network Function
VNO	Virtual Network Operator
V-Security	Virtualized Security

**<END OF DOCUMENT>**