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# D10.1 – Report on first open call experiments

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| Abstract | This deliverable represents a collection of individual deliverables provided by the Fed4FIRE experimenters who joined the project after the 1st Open Call:<br>GEO-Cloud, ChaosFire, SSC, MEVDDS, MEDiANET, IPCS4Fire, SCS4Fire, and HEMOSF. |
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| Nature of the deliverable | R | Report | X |
| | P | Prototype | |
| | D | Demonstrator | |
| | O | Other | |
| Dissemination level | PU | Public | X |
| | PP | Restricted to other programme participants (including the Commission) | |
| | RE | Restricted to a group specified by the consortium (including the Commision) | |
| | CO | Confidential, only for members of the consortium (including the Commission) | |

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# Contents

# 1 Introduction

This deliverable represents a collection of individual deliverables provided by the Fed4FIRE experimenters, who joined the project after its 1st Open Call for Experimenters, which was open and concluded in 2013, so that the following experiments formally joined the project in December 2013:

- GEO-Cloud
  - Partner: Elecnor Deimos
  - Used testbeds: BonFIRE, PlanetLab Europe, Virtual Wall
- ChaosFire
  - Partner: MTA SZTAKI
  - Used testbeds: Smart Santander, BonFIRE, Virtual Wall
- SSC
  - Partner: National University of Ireland Galway
  - Used testbeds: Smart Santander, PlanetLab, BonFIRE, Virtual Wall
- MEVDDS
  - Partner: Lancaster University
  - Used testbeds: OFELIA (Bristol and i2CAT islands), Virtual Wall
- MEDiANET
  - Partner: WOOX Innovations
  - Used testbeds: Virtual Wall, w-iLab.t
- IPCS4Fire
  - Partner: University of Kent
  - Used testbeds: Virtual Wall, BonFIRE
- SCS4Fire
  - Partner: University of Kent
  - Used testbeds: Virtual Wall, BonFIRE
- HEMOSF
  - Partner: Televes
  - Used testbeds: Virtual Wall, BonFIRE

Within the Fed4FIRE WP10, specific project tasks and activities have been created for each of the experiments, which included the following phases:

1. Detailed design of the experiments
2. Experiment setup and implementation within the Fed4FIRE testing environment, by using the Fed4FIRE testbeds and tools
3. Experiment execution and validation

Reporting on the related activities in WP10 has been performed individually for each of the experiments and the related deliverables are provided as annexes of this document as separated deliverables. Brief summaries of main objectives of the experiments are provided below.

# 2 Brief Experiment Descriptions

## 2.1 GEO-Cloud

This experiment consists of virtualizing a conventional Earth Observation (EO) system to offer on demand services to clients with the objective of validating its viability, find the strengths and weaknesses of using cloud computing technology and establish possible solutions for a future implementation in the market. The experiment focuses on the following aspects:

- Detailed design of the cloud model: communications, information access and, storage and processing of data online and on demand. Technologies beyond OGC standards for geospatial data delivery and distribution are considered.
- Detailed design of the end users model: access to the information, demand loads and impairments.
- Detailed design of the EO in-orbit mission: data transfer from the satellites to the ground stations, number and location of ground stations for daily coverage.
- Analysis and validation of the different configurations and models implemented in the infrastructure and benchmarking to compare and classify the different levels of demand, link them to services and to the cloud computing technology to find the limitations and advantages of using cloud computing to offer an acceptable service to users with remote access.

The experiment has been performed by Elecnor Deimos, where BonFIRE, PlanetLab Europe, and Virtual Wall testbeds have been used.

## 2.2 ChaosFire (Measuring Effectiveness of an Opportunistic Network Platform for Sensor Data Collection and Distribution)

The goal of this experiment is to evaluate the performance and usability of peer to peer mobile technologies as an alternative mean to central service based solutions to collect and distribute sensor information in an urban area. For the purpose of the evaluation the experiment took place in the SmartSantander testbed, by using the Chaoster technology as the peer to peer mobile infrastructure.

The experiment has been performed by MTA SZTAKI, where Smart Santander, BonFIRE, and Virtual Wall testbeds have been used.

## 2.3 SSC (Super Stream Collider)

Objectives of the SSC experiment are:

- Tapping into and synergistically boosting the research potential of Fed4FIRE testbed facilities in the area of large scale IoT cloud data processing and applications to be provisioned in cloud environments
- Enlarging the community that can benefit from innovative use of Fed4FIRE testbeds, and enabling knowledge transfer of Fed4FIRE results to academia and industry and other interested stakeholders;
- To validate the distributed data processing nature by deploying the IoT annotated collected data as part of a fully distributed, scalable and reliable, accessible any time, for high performance annotated data processing
- To test the Super Stream Collider (SSC) features on multi-domain collected data processing and distributed data collection gateways running interconnected servers; 5) and establishing new cooperation links and increasing the currently limited level of cooperation of DERI-NUIG with FeD4FIRE partners to enable exchange of knowledge and improve the scientific novelty and quality of the partner members and DERI-NUIG.

The experiment has been performed by National University of Ireland Galway, where Smart Santander, PlanetLab, BonFIRE, and Virtual Wall testbeds have been used.

## 2.4 MEVDDS (Multi-testbed Experimentation of a Video-on-Demand Distribution Service)

The goal of this experiment is to extensively evaluate a OpenFlow-assisted VoD distribution architecture for cross-site deployment, using the multi-site testbeds of Fed4FIRE, in particular

- To perform the appropriate configuration and extend the OpenFlow-assisted VoD distribution architecture to facilitate efficient caching and distribution of VoD flows that have to traverse multiple geographically distributed sites of differing capabilities (i.e. different testbeds on the Fed4FIRE facility). The achieved results help to understand better the VoD distribution architecture that could later be deployed across the Internet as a whole.
- To use the experimentation tools of the Fed4FIRE facility to evaluate end-to-end cross-site VoD traffic over different types of testbeds, from both a network and a user's point of view; utilization of networks, software and hardware infrastructure, Quality-of-Experience perceived by the end user.

The experiment has been performed by Lancaster University, where OFELIA (Bristol and i2CAT islands) and Virtual Wall testbed have been used.

## 2.5 MEDiANET

Overall objective of this experiment is to deploy embedded audiovisual end-points, on the selected wireless experimental facilities of the Fed4FIRE and perform functional and performance evaluation of the Pragmatic General Multicast (PGM) protocol. The goal of the experiment is to get tangible evidence as to whether PGM may efficiently enable implementation of synchronous media streaming applications whereby both media sources and renderers are within the borders of residential wireless networks, under specific congestion conditions that are known for causing impairment of media streaming quality.

The experiment has been performed by WOOX Innovations, where Virtual Wall and w-iLab.t testbeds have been used.

## 2.6 IPCS4Fire (Intelligent Protection Cloud Service for the FIRE)

Intelligent Protection is a cloud security service that has been designed and developed to address the user demand for protecting virtual servers and hosted applications on cloud infrastructures. The novelty of this service centres on offering security & protection of hosted systems, application and data as a value-added service (multi-tenant security SaaS) while enforcement is delivered via the cloud infrastructure, with minimal integration overhead. It enhances cloud user experience by offering more secure, flexible, automated security management for Applications deployed or on-boarded on Cloud Infrastructures (IaaS) such as BT Compute or other 3rd party equivalents (e.g. Amazon EC2 or V-Cloud enabled while placing the users in control of their own security operations though its Security SaaS operations dashboard.
The following experimentation streams have been performed:

- Validation of efficiency and flexibility of deploying the agent-based components of Intelligent Protection and their effectiveness in protecting applications
- Analysis of scalability of the intelligent protection provisioning and operational security management scheme by testing the deployment on hundreds of VMs simultaneously and in a mixture of VMs reflecting different architectures and in heterogeneous cloud environments
- Study on development of a professional service around the deployment and automatic deployment of proprietary security patches that are specifically designed to protect home-grown applications or applications that are not supported by major vendor security patch releases.

The experiment has been performed by University of Kent, where Virtual Wall and BonFIRE testbeds have been used.

## 2.7 SCS4Fire (Secure Cloud Storage as a Service)

Most of the existing secure cloud storage services focus on the file-level encryption of the user data, following one of the two approaches. Either the data is uploaded on the cloud provider and then encrypted and the keys are managed by the service provider as well, as for example in Dropbox, Google Drive, Microsoft Sky Drive, or the data is encrypted at the user end and then uploaded to the secure storage service provider and the keys are managed by the user, as in BoxCryptor or the Virtual Cloud Drive. Although this approach is fine from the point-of-view of online backup and write-once read-many types of scenarios, it becomes very unyielding when the data may not need to be backed up, may have to be modified frequently and spends most of its life in the virtual machines in the cloud rather than on the user's machine. This will become even more complicated when the user wants to take advantage of the growing inter-cloud usage scenarios in the upcoming Future Internet, where virtual machines deployed on multiple cloud platforms and domains have to collaborate and communicate with each other to provide services to their users.
In the scope of this experiment, Secure Cloud Storage scenarios have been set-up and investigated.

The experiment has been performed by University of Kent, where Virtual Wall and BonFIRE testbeds have been used.

## 2.8 HEMOSF

The HEMOSF experiment aims to overcome the difficulties of testing Televes' specific head-end communications protocol and new TV head-end management system in a real scenario, where a high number of users and TV head-ends will be connected through a server.
Nowadays Televes has a limited number of units of head-ends in the market using the new management system but the prevision is that in the next year the number of head-ends connected to the management system will grow exponentially. However, Televes has no knowledge about the behavior of the system. An analysis is needed to know if the specific used head-end communications protocol can support future services and a higher number of users and head-ends. The main issues tackled in this experiment are the complete analysis of the new head-end management TV system and his protocol, scalability, number of users and head-ends that the system can support combining different kind of services and parameters.

The experiment has been performed by Telves, where Virtual Wall and BonFIRE testbeds have been used.