An overview of Fed4FIRE testbeds – and beyond?

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1 Introduction and motivations

We have now reached a point where there is a large number of testbeds available for experimenters throughout the world, each with its own features and capabilities. This is a good thing of course, but also a bad thing, because it is getting increasingly difficult for potential users to identify which testbeds would better match their needs. It is not unusual at all to encounter researchers that were not aware that the experiments they performed could have been done much more efficiently on a publicly available testbed. Also, one could also argue that this results in useless duplication of efforts between testbed efforts, even if there is some value to exploring different ways to solve the same issues.

In the context of the Fed4FIRE+ project, we have been working on presenting a better overview of Fed4FIRE testbeds – the current state being the Fed4FIRE website[1]. Section 2 provides the current state of this overview (and can serve as a technical introduction to Fed4FIRE testbeds), while Section 3 discusses possible future work in that area, in the context of GEFI.

2 Fed4FIRE testbeds

17 testbeds (14 from Fed4FIRE, 3 outside Fed4FIRE) were analyzed, and are described in Table 1 and Table 2. 13 are wireless testbeds, while 4 testbeds address wired networking, cloud, HPC, or nodes distributed at large.

Wireless testbeds (Table 1) differ on various aspects:

- The environment they are deployed in: anechoic chambers, various indoor or outdoor environments
- The protocols they support
- The hardware they rely on, and the services they provide

The other testbeds (Table 2) are much more diverse, even if Grid'5000 and VirtualWall (which is based on the Cloudlab software stack) are similar in terms of features, as it was pointed in the past [1].

3 Plans for collaboration

This work is still at a preliminary stage. And despite discussions about surveys during the previous GEFI meetings, we have not made much progress towards building an overview of the available testbeds offerings. The GEFI workshop could be a good opportunity to discuss ways to make concrete progress. One idea that could be explored is to start small, and aim for a Wikipedia comparison page[2]. But that still requires us to refine comparison criterias.

References

[1] Lucas Nussbaum. Testbeds Support for Reproducible Research. In *ACM SIGCOMM 2017 Reproducibility Workshop* , Los Angeles, United States, August 2017.

[1] https://www.fed4fire.eu/testbeds/

[2] example: https://en.wikipedia.org/wiki/Comparison_of_text_editors

Name & website	Categories (F4F web)	Patron, Country	Hardware	Environment	Typical protocols	Services
FuSeCo	Wireless	Fraunhofer, Berlin				
IRIS	Wireless	Trinty College Dublin, Ireland	20x USRP N210	Indoor	5G, any (SDR)	
LOG-a-TEC	Wireless	JSI, Slovenia		Outdoor	6LoWPAN, ZigBee	
NETMODE	Wireless	NTUA, Greece		Indoor + roof	Wi-Fi	
PerformLTE	Wireless	UMA, Spain		Indoor ?		4G / LTE
Smart Santander	Wireless	UC, Spain		outdoor	802.15.4	access to collected data only
w-iLAB.t	Wireless	imec, Belgium	embedded PCs with several wireless NICs	Indoor (utility room + offices)	Wi-Fi + 802.15.4 + BT + some USRPs (SDR)	bare-metal access to nodes
CityLab	Wireless, IoT	imec, Belgium	32 nodes. embedded PCs with several wireless NICs	Outdoor (city)	Wi-Fi + 802.15.4 + BT + LORA	bare-metal access to nodes
Portable Wireless Testbeds	Wireless, IoT	several	embedded PCs with several wireless NICs	depends on deployment	Wi-Fi, 802.15.4, spectrum scanners	bare-metal access to nodes
NITOS	Wireless, OpenFlow	CERTH, Greece	embedded PCs with several wireless NICs + some USRPs	indoor and outdoor	Wi-Fi, WiMAX, LTE	
FIT IoT-Lab	Not in F4F	SU / Inria / others, France	MSP430 or STM32 microcontrollers, Cortex A8 linux board. some mobile robots	indoor (several deployments, dedicated rooms or offices)	802.15.4. some BLE	
FIT CortexLab	Not in F4F	SU / Inria / others, France	29 x USRP N2932, Nutaq PicoSDR	indoor (anechoic chamber)	any (SDR)	
FIT R2Lab	Not in F4F (yet)	SU / Inria / others, France	Nitos X50, USRP B210, USRP N210, USRP 2, and USRP 1, LimeSDR, smartphones	indoor (anechoic chamber)	Wi-Fi, any (SDR)	bare metal access

Table 1: Wireless testbeds

Name & Website	Categories on F4F website	Patron, Country	Type of hardware
Tengu	Big Data	imec, Belgium	Deployment of Big Data software stacks
OFELIA I2CAT island	OpenFlow	i2CAT, Spain	OpenFlow-enabled switches (NEC IP8800) + end hosts (VMs)
PL-LAB	Wired	PSNC, Poland	Traffic generator + NetFPGA (as Programmable switches) + routers + some bare-metal servers
PlanetLab Europe	Wired	UPMC, France	nodes distributed over the Internet
ExoGENI	OpenFlow	UvA, Netherlands	OpenStack cloud
Virtual Wall	Wired, Cloud	imec, Belgium	Two clusters of nodes with network emulation
Grid'5000	Wired, OpenFlow, Cloud, Big Data	Inria, France	About 30 clusters of nodes, on 8 sites

Table 2: Other testbeds