

**PLATFORM FOR ONLINE
INTEROPERABILITY AND
PERFORMANCE TEST**



Remote Conformance & Interop Testing

**Info Session – IETF96 – Berlin
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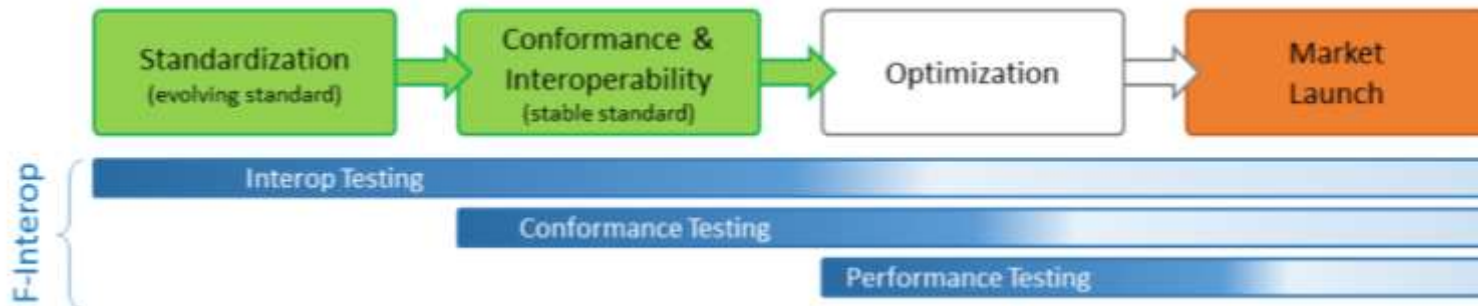
Goals



1. Describe the F-Interop platform
2. Is this useful for the IETF community?
3. How can the IETF community contribute?



Why remote conformance & interop?



➤ SDOs

- save time and resources
- running code early
- accelerate standardization process

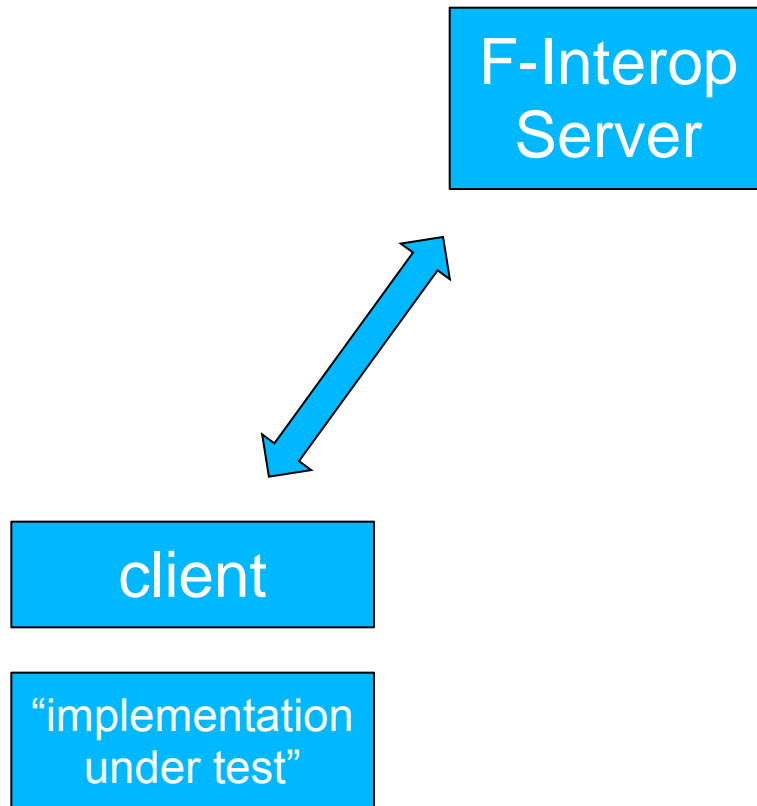
➤ SMEs and companies

- interop tests without needing to travel
- lower development cost
- faster development of standards-based products

→ more standards-based products



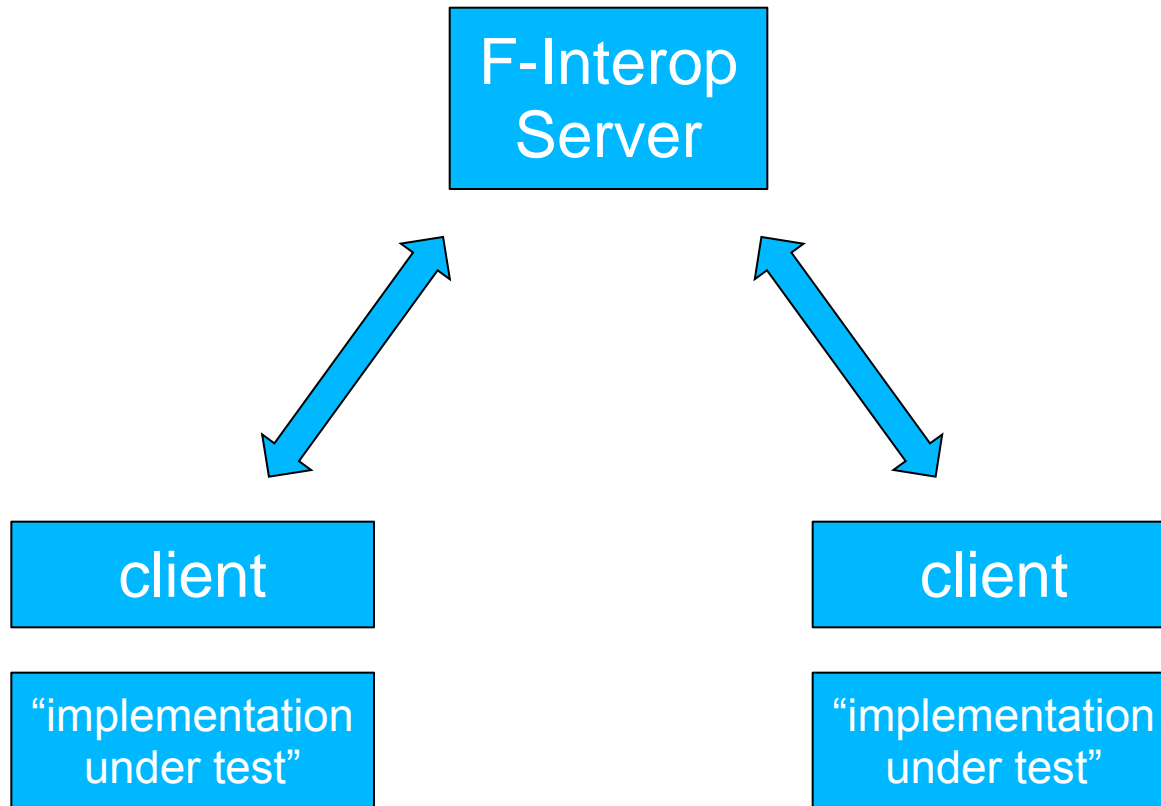
Core Idea



Conformance Testing



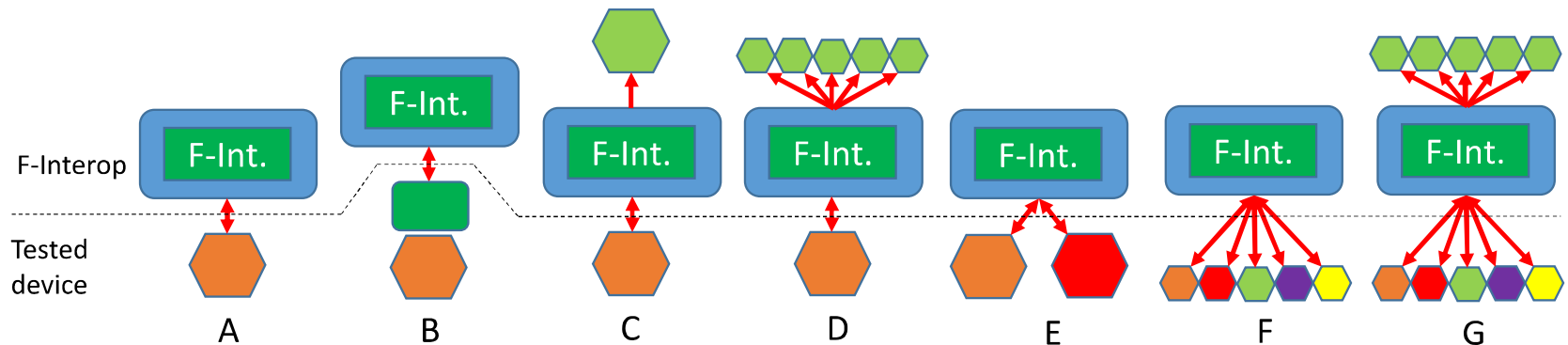
Core Idea



Interop Testing



Different Configurations



- A. Tested Device \leftrightarrow F-Interop test server
- B. Deported test with downloaded resource
- C. Remote interop with 2 participants
- D. Interop against testbed
- E. Local interop
- F. Remote interop with N participants
- G. Remote interop with N participants and testbeds

F-Interop H2020 Project



- www.f-interop.eu
- 1 November 2015 – 31 October 2018
- *develop and provide online interoperability and performance test tools to support emerging technologies from research to standardization and market launch*
- 9 partners

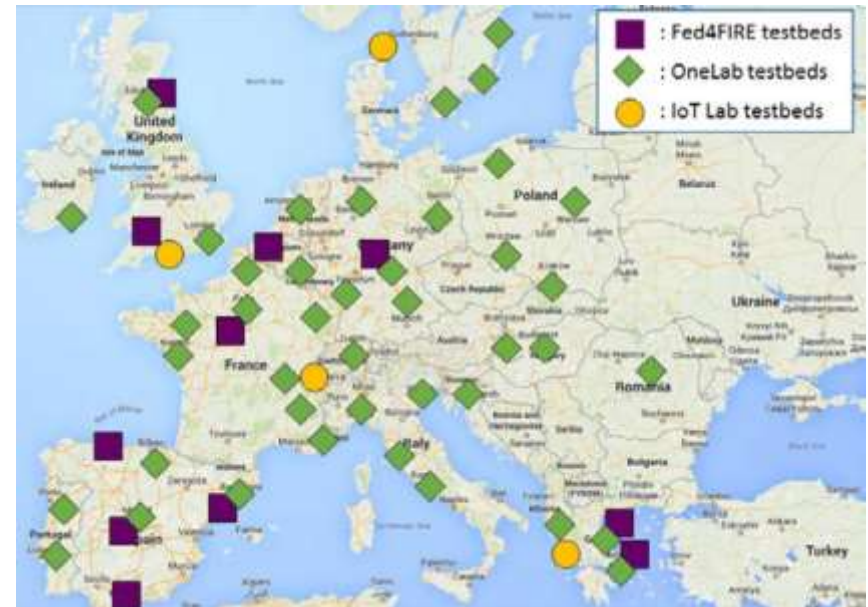


Testbeds



32 testbeds, 4755 nodes

- Fed4FIRE
(www.fed4fire.eu/testbeds)
 - 24 testbeds
 - ~1000 nodes
- OneLab
(onelab.eu)
 - Includes 6 IoT-lab deployments (including 2728 IoT nodes)
- IoT lab
(www.iotlab.eu)



Targeted Standards



- Initially standards of the IoT realm
- We take, as a starting point, the ETSI plugtests specifications and build an architecture that allows those to be done remotely (CoAP, 6TiSCH, 6LoWPAN)
- **Contributions/extensions are expected by design**

Demo!



Example CoAP Test

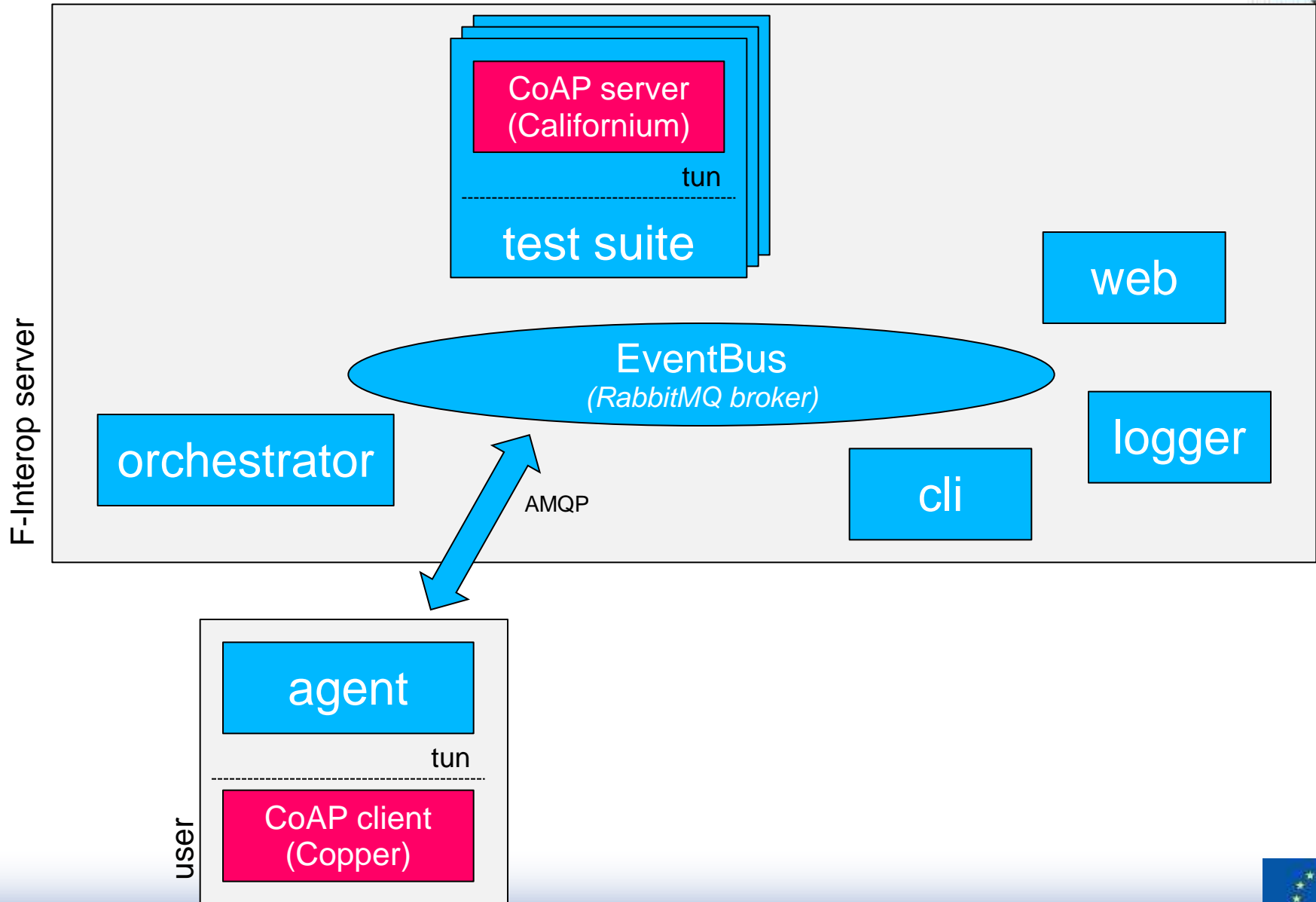


- From ETSI plugtest CoAP#4, IETF89 (London)

Interoperability Test Description			
Identifier:	TD_COAP_CORE_01		
Objective:	Perform GET transaction (CON mode)		
Configuration:	CoAP_CFG_BASIC		
References:	[COAP] 5.8.1, 1.2, 2.1, 2.2, 3.1		
Pre-test conditions:	Server offers the resource /test with resource content is not empty that handles GET with an arbitrary payload		
Test Sequence:	Step	Type	Description
	1	Stimulus	Client is requested to send a GET request with: <ul style="list-style-type: none">• Type = 0 (CON)• Code = 1 (GET)
	2	Check	The request sent by the client contains: <ul style="list-style-type: none">• Type=0 and Code=1• Client-generated Message ID (→ CMID)• Client-generated Token (→ CTOK)• Uri-Path option "test"
	3	Check	Server sends response containing: <ul style="list-style-type: none">• Code = 2.05 (Content)• Message ID = CMID, Token = CTOK• Content-format option• Non-empty Payload
	4	Verify	Client displays the received information



Base Architecture (CoAP example)



Download the Agent



F-interop
A platform for interoperability testing

Home
Download the agent

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IETF 96 demo

Goals

- Testing CoAP GET [link to the test description](#)
- Tests coming from: Test Descriptions for ETSI plugtest CoAP#4. [IETF89](#)
- Testing an already existing implementation (copper/coap).

Set up

- Download the agent (Will be released later on after documentation)
<http://f-interop.paris.inria.fr/static/agent/agent.py>
- Connect to the session *bonjour* with username/password and we play the role of a *client*



Connect to the F-Interop Server



```
# sieben @ sieben-lincs in ~/Dropbox/workspace/f-interop_ietf on git:develop x [14:29:58] C:1
$ sudo python -m finterop.agent.agent connect --user bonjour --session bonjour --name client
Password: █
```



Select and Start the Test Case

A screenshot of a web browser displaying the Finterop client interface. The browser's address bar shows the URL "f-interop.paris.inria.fr/session/bonjour/coap". The page header includes the F-INTEROP logo on the left and the Inria logo on the right. The main content area is divided into three panels: "Test cases", "Console", and "No Frame Selected".
The "Test cases" panel, titled "Test case references", contains a list of three test cases:

- TD_COAP_CORE_01**: Perform GET transaction (CON mode) - This item is highlighted with a blue background.
- TD_COAP_CORE_02**: Perform DELETE transaction (CON mode)
- TD_COAP_CORE_03**: Perform PUT transaction (CON mode)

The "Console" panel features a green "Start Test Case" button at the top. Below it, a message box states "28 test cases loaded". A light blue box displays the "CoAP server URL: coap://[bbbb::2]/test".
The "No Frame Selected" panel shows a "No Frame" message and a "Frame list" section, both indicating that no frame or test case is currently selected.

Send CoAP Packets



[bbbb::2]:5683 (RTT: 115ms)
2.05 Content

Value	Option	
T... Acknowledgment	Content-F...	0
C... 2.05 Content	Max-Age	...
... 63915		
T... empty		

Payload (38)

Incoming Rendered Outgoing

```
Type: 0 (CON)
Code: 1 (GET)
MID: 63915
```





Finish Test Case

A screenshot of the Finterop client web interface in a Google Chrome browser. The browser's address bar shows the URL "f-interop.paris.inria.fr/session/bonjour/coap". The page header includes the F-INTEROP logo on the left and the Inria logo on the right. The main content area is divided into three sections: "Test cases", "Console", and "No Frame Selected".
- The "Test cases" section contains a list of test case references: "TD_COAP_CORE_01 Perform GET transaction (CON mode)", "TD_COAP_CORE_02 Perform DELETE transaction (CON mode)", and "TD_COAP_CORE_03 Perform PUT transaction (CON mode)".
- The "Console" section features a red button labeled "Finish Test Case" which is circled in red. Below it, a message box states "28 test cases loaded" and another box displays the "CoAP server URL: coap://[bbbb:2]/test".
- The "No Frame Selected" section contains a "No Frame" message and a "Frame list" section that says "No test case selected for the moment".

Verdict!





Test cases

- TD_COAP_CORE_01 pass
Perform GET transaction (CON mode)
- TD_COAP_CORE_02 pass
Perform DELETE transaction (CON mode)
- TD_COAP_CORE_03 pass
Perform PUT transaction (CON mode)
- TD_COAP_CORE_04 pass
Perform POST transaction (CON mode)
- TD_COAP_CORE_05 inconc
Perform GET transaction (NON mode)
- TD_COAP_CORE_06 pass
Perform DELETE transaction (NON mode)
- TD_COAP_CORE_07 fail
Perform PUT transaction (NON mode)
- TD_COAP_CORE_08** pass
Perform POST transaction (NON mode)
- TD_COAP_CORE_09
Perform GET transaction with separate response (CON mode, no piggyback)
- TD_COAP_CORE_10
Perform GET transaction containing non-empty Token (CON mode)
- TD_COAP_CORE_11
Perform GET transaction containing non-empty Token with a separate response (CON mode)
- TD_COAP_CORE_12
Perform GET transaction using empty Token (CON mode)
- TD_COAP_CORE_13
Perform GET transaction containing several URI-Path options (CON mode)
- TD_COAP_CORE_14

Console

Start Test Case

TD_COAP_CORE_07
Gave the verdict fail
Review frames:
4, 5
More informations
127.0.0.1 | CoAP [NON 13185] PUT /test> [pass] match: CoAP(type=1, code=3) [fail] mismatch:
CoAP(opt=Opt(CoAPOptionContentFormat()), pl=Not(b'')) CoAP(opt: CoAPOptMismatch got: expected: CoAPOptionContentFormat) 127.0.0.1 | CoAP [NON 59898] 2.04 Changed > [pass] match: CoAP(type=1, code=Any(65,68), tok=b'xda')

Test case TD_COAP_CORE_07 started, press the Finish button when completed.

TD_COAP_CORE_06
Gave the verdict pass
Review frames:
2
More informations

TD_COAP_CORE_05
Gave the verdict inconc
Review frames:
1, 2
More informations

TD_COAP_CORE_04
Gave the verdict pass
Review frames:
2
More informations

Analyse TC - TD_COAP_CORE_07

Frame n°4

CoAP:

- Version: 1
- Type: 1
- TokenLength: 2
- Code: 3
- MessageID: 0x3381
- Token: b'xda'
- Options:
 - CoAPOptionUriPath:
 - Delta: 11
 - Length: 4
 - Value: test
- Payload: b'98'

UDP

IPv4

Null, cogback

Frame list

1. [127.0.0.1 -> 127.0.0.1] UDP 50845 -> 50845
2. [127.0.0.1 -> 127.0.0.1] UDP 49374 -> 5684
3. [127.0.0.1 -> 127.0.0.1] Internet Control Message
- 4. [127.0.0.1 -> 127.0.0.1] CoAP [NON 13185] PUT /test**
- 5. [127.0.0.1 -> 127.0.0.1] CoAP [NON 59898] 2.04 Changed**



Under the Hood: What's a test?

```
#!/usr/bin/env python3

from ttproto.ts_coap.common import CoAPTestcase
from ttproto.ts_coap.templates import *

class TD_COAP_CORE_01 (CoAPTestcase):

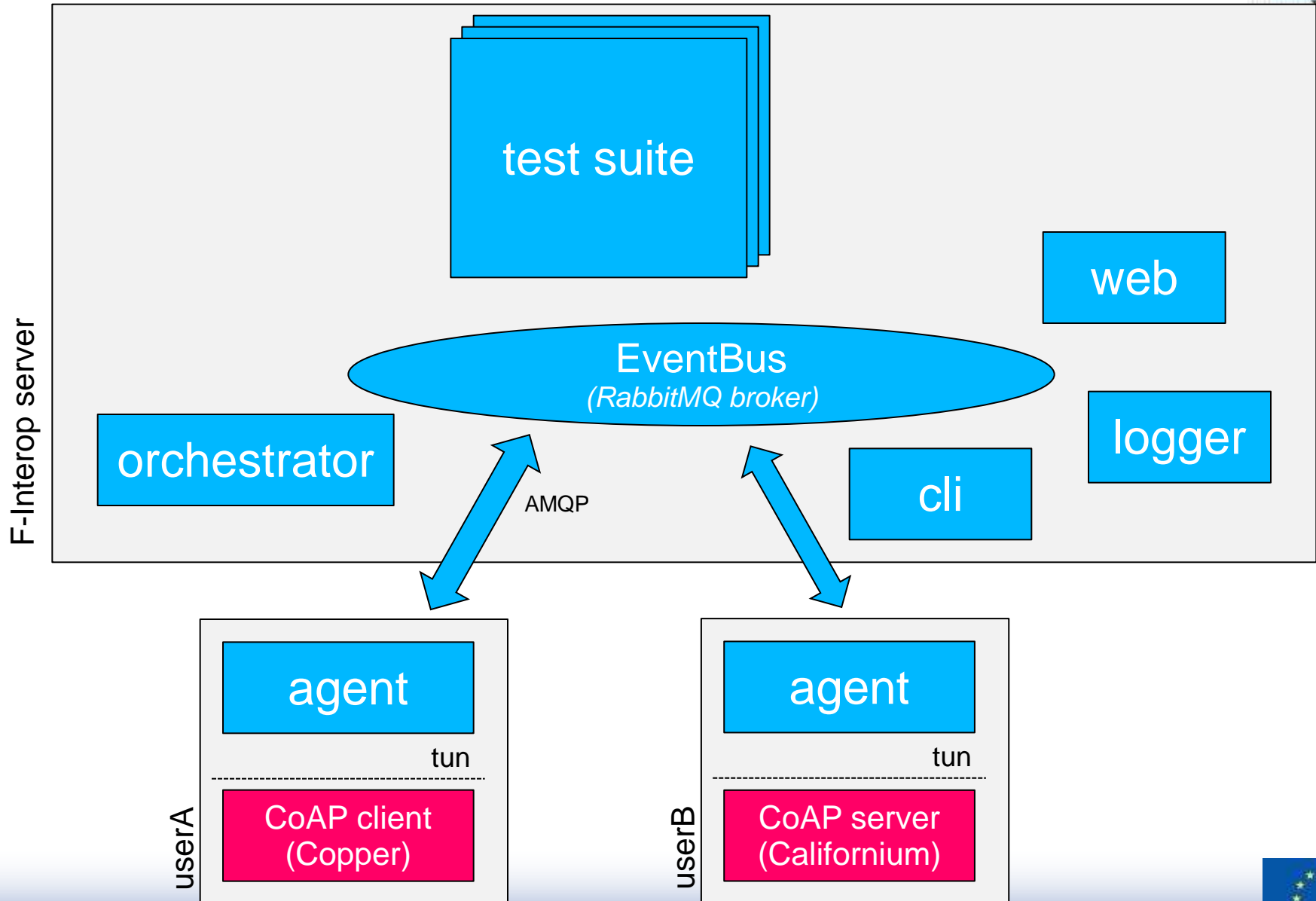
    def run (self):

        # match stimuli
        self.match_coap ("client", CoAP (type="con", code="get",
                                         opt = self.uri ("/test")))
        CMID = self.frame.coap["mid"]
        CTOK = self.frame.coap["tok"]

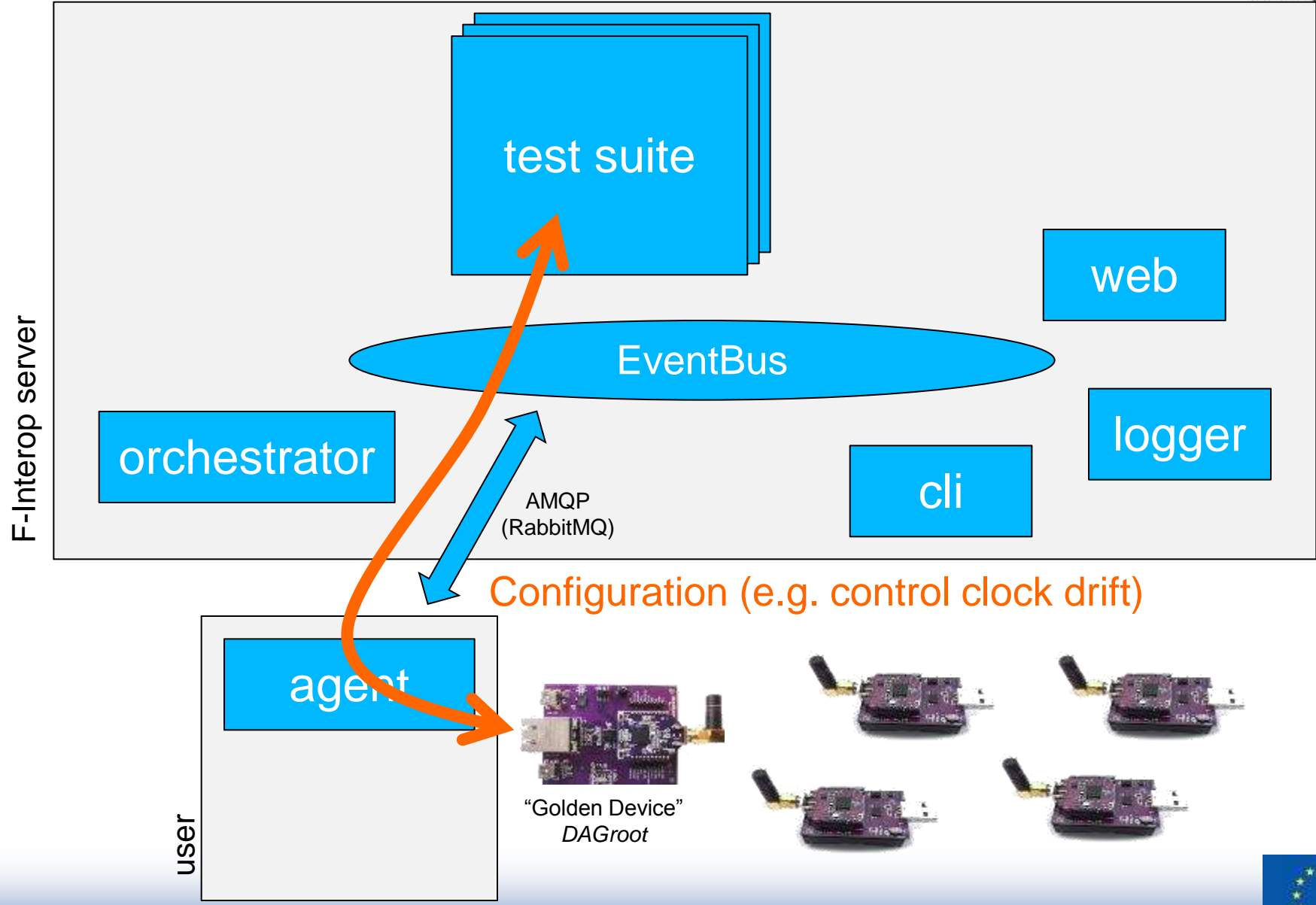
        # match step 2
        self.next()
        if self.match_coap ("server", CoAP (
            code = 2.05,
            mid = CMID,
            tok = CTOK,
            pl = Not(b""),
        )):

            # match step 3
            self.match_coap ("server", CoAP (
                opt = Opt (CoAPOptionContentFormat()),
            ), "fail")
```

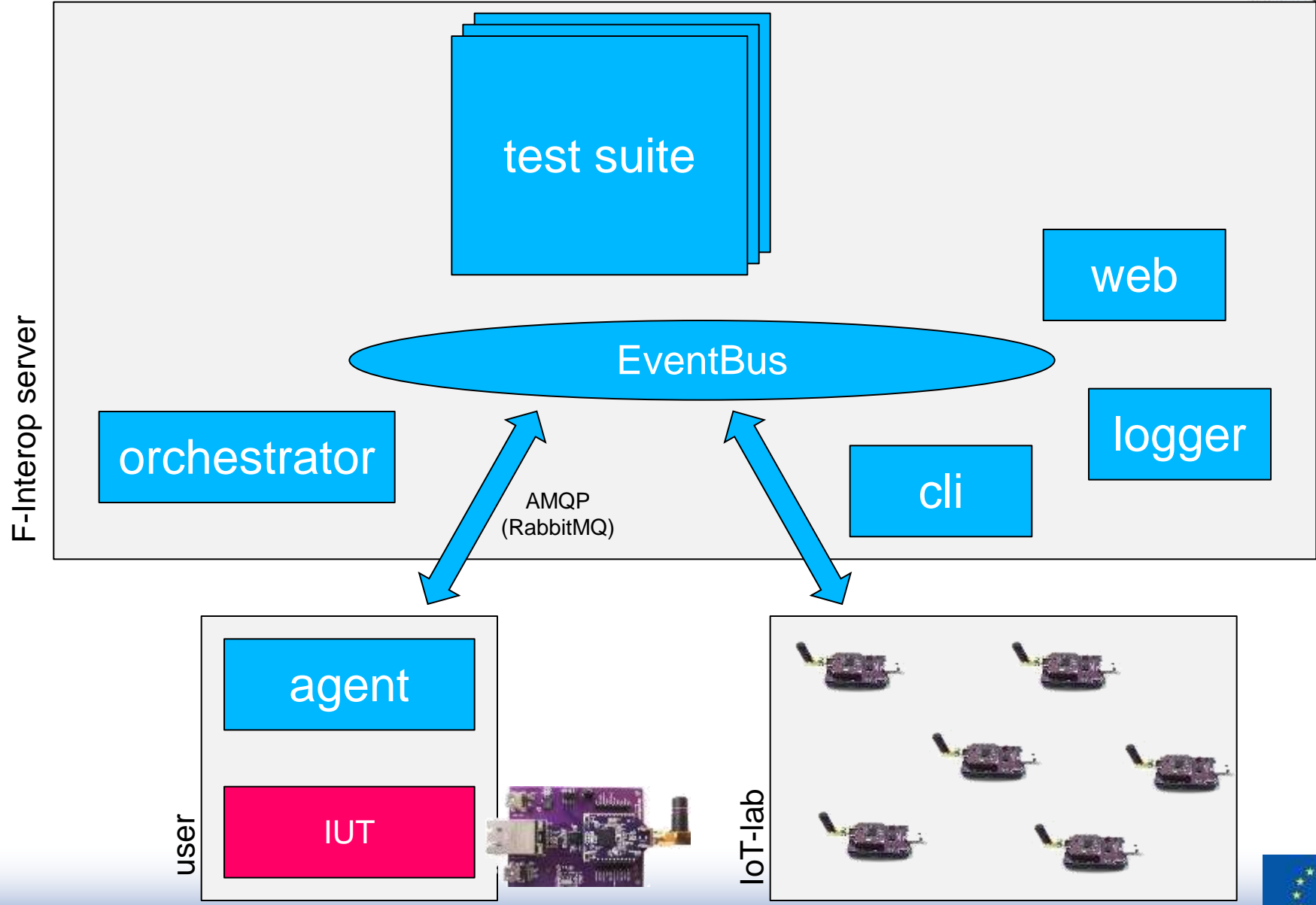
Base Architecture (CoAP interop)



Advanced Architecture (6TiSCH example)



Advanced Architecture (testbed example)



Advanced Architecture



- Integration into continuous integration
- On a testbed, loading imageA on 50 nodes, imageB on 50 nodes, verify interoperability
- Build virtual networks with sniffers replaying packets heard at userA at userB
- ...



Next Milestones



- July 2016
 - minimal CoAP testing
- November 2016
 - Functional platform
- March 2017
 - 6TiSCH support, update at IETF98
- July 2017
 - Use at 6TiSCH/6lo plugtests



What about the IETF?



- Contributors:
 - Develop test suites for (new) standards
 - Provide feedback on architecture and choices
 - List requirements, identify standards
- Users:
 - Use F-Interop for remote interop events





Open Call



Open Call Categories



- **New testing tools** to extend capabilities of F-Interop
- **New test descriptions** to test conformance and interoperability of other standards
- **Plugtests** to conduct 3 remote online plugtest events
- **SME device Interop tests** to test F-Interop platform



Supported Activities & Budget

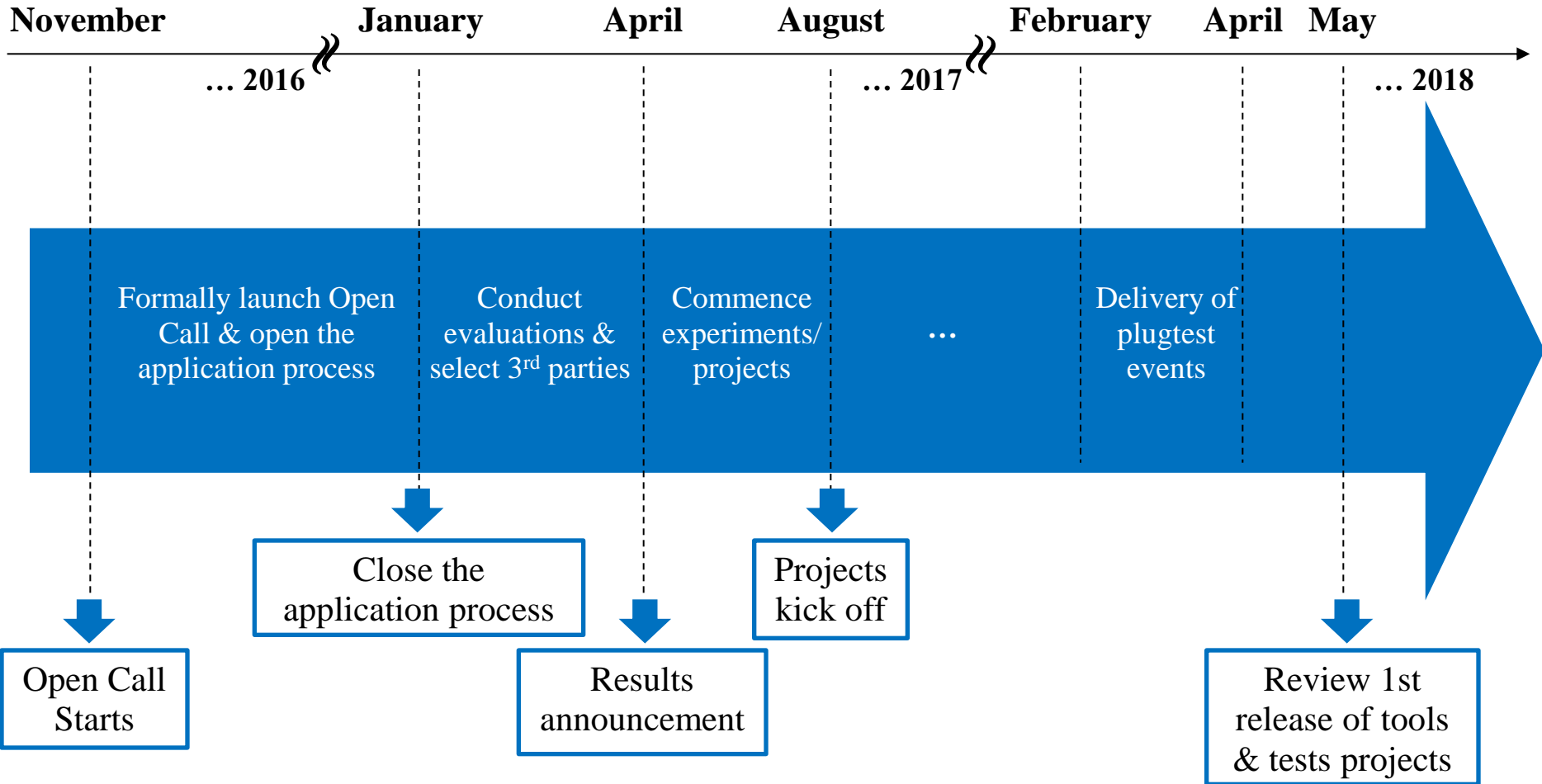


610k for 19 projects

List of Categories	Grants	Award
New F-Interop tools extensions	3	100 000
New interop test descriptions	3	60 000
Plugtests	3	10 000
SME devices F-Interop tests and report	10	10 000



Important Dates



How to apply?



- Template for the proposal
- Guide for Applicants
- Standard Industrial Experiment Contract
- Open Call Terms and Conditions
- Submission Portal

www.f-interop.eu



