















WiSHF

UNIFIED RADIO AND NETWORK CONTROL ACROSS HETEROGENEOUS HARDWARE PLATFORMS

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- Wireless Software and Hardware platforms for
 Flexible and Unified radio and network control.
- Call: H2020-ICT-2014-1
- □ Topic: ICT-11-2014 (FIRE+)
- □ Type of action: RIA
- □ Budget: 5.171 M€
- Duration: 36 M
- Partners



OUTLINE





Motivation

Use cases & Requirements

WiSHFUL software architecture

□ Conclusion

Relation to (pre-)standardisation

MOTIVATION



'OFF-THE-SHELF' HW AND SW ARE NOT FLEXIBLE

- closed radio drivers
- limited functionality
- no documentation of interfaces
- minor tweak or adaptation may require huge effort and cost

SDR PLATFORMS ARE FLEXIBLE, BUT...

- lack of high-level specifications and programming tools
- focus on PHY layer development
- low performance in terms of time control
- limited uptake in end-to-end wireless solutions in the industry

MOTIVATION

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TODAY

- many radio devices, each of them with specific HW and SW platforms
- many implementations of protocol stacks
- non-unified, limited or no control of radio and network



FUTURE

 need for flexible radios and network stacks that adapt to wireless context and application requirements

UC1: traffic-aware 802.11 airtime management

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UC1: traffic-aware 802.11 airtime management

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NEED FOR

- co-channel interference avoidance techniques (addressing hidden node problem)
- dynamic control of multiple APs through global monitoring of performance of APs (adapt channel access pattern)



UC2: Co-existence of heterogeneous technologies



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UC2: Co-existence of heterogeneous technologies

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NEED FOR

- discovery of co-located networks within interference range
- sharing information on network load, used channels, MAC schedules
- mitigation functionality (channel exclusions, time synchronization between heterogeneous networks, tuning MAC parameters, etc.)



UC3: Load and interference aware MAC adaptation

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- dynamic environments: increasing number of coexisting nodes and traffic flows
- heterogeneous technologies, HW and SW platforms

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□ different MAC protocols: contention-based and schedule-based



UC3: Load and interference aware MAC adaptation



Other use cases **WISHF** 12 Intelligent download with WiFi Tethering Control plane 3G/4G Data plane defer any 'unnecessary' Tethering AP traffic flows Set IE / Internet Controller Set firewall rule Å 802.11 AP Set firewall STA rule 3G/4G BS □ WiFi off-loading configure Control plane association, get Data plane flow info use Wi-Fi as an steer flows extension to the 3G/4G WIFI 802.11 cellular network AP EUT cloud-based 3G/4G BS controller Internet

WiSHFUL software architecture

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Device specific (HW & SW platform), implemented by WiSHFUL

Device independent (within device class), implemented by experimenter

Supported UPIs and platforms

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MCE: Monitoring & Configuration Engine

Adaptation modules

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MCE: Monitoring and Configuration Engine

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Conclusion



- WiSHFUL SW architecture offers a working implementation for runtime unified radio and network control of heterogeneous wireless technologies and platforms
- WiSHFUL SW architecture has been experimentally validated for several use cases
- Source code is available for experimentation at http://wirelesstestbedsacademy.github.io/ wishful_upis/

Relation to (pre-)standardisation

WiSHFUL aims to contribute to ETSI standardisation activities with its SW architecture and UPIs

RRS (WG2)

Multi-RAT technologies



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WiSHFUL SW architecture extends SDN concept with advanced control functionalities, including medium access and radio control



More info on WiSHFUL

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Open calls

4 monthly open calls for experiments

2 open calls for extensions

More info: www.wishful-project.eu/open-calls