



StandICT.eu 2023
ICT STANDARDISATION OBSERVATORY AND SUPPORT FACILITY IN EUROPE

IoT in the IETF

Maria Ines Robles – mariaines.robles@tuni.fi

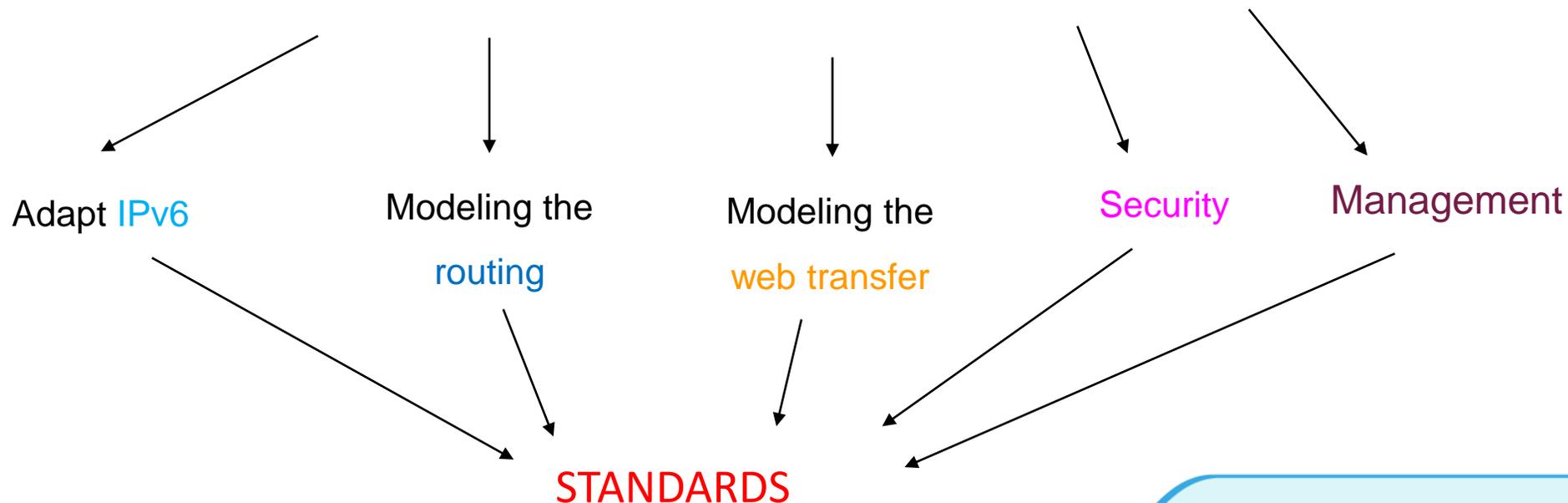


StandICT.eu has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement **No. 951972**.

IoT(Internet of Things)

Everything that can be connected will be connected

Adapt the Internet to different types of networks such as constrained networks/nodes,
e.g. send temperature in an IEEE 802.15.4 packet



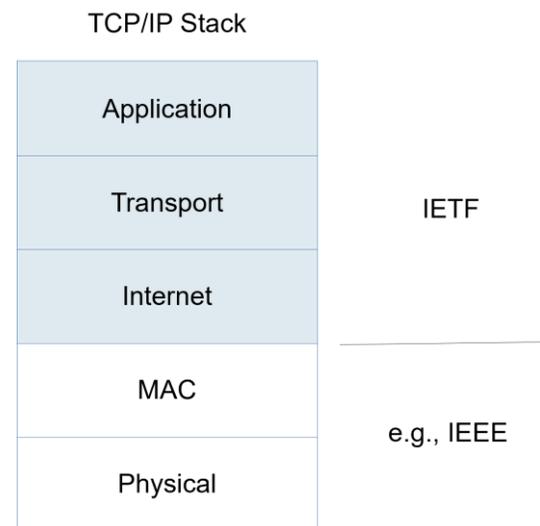
What is the



The Internet Engineering Task Force (IETF) is an **OPEN** international community => **make the Internet work better** by producing technical documents that influence the way people use the Internet.

IETF Principles

- **Open** process
- **Technical** competence
- **Volunteer** Core
- **Protocol** ownership
- **Rough** consensus and **running** code



IETF Areas:

Routing Area (rtg): Area Director

Working Groups (WG)

Babel routing protocol
BGP Enabled Services
Bidirectional Forwarding Detection
Bit Indexed Explicit Replication
Common Control and Measurement Plane
Deterministic Networking
Interface to the Routing System
Inter-Domain Routing
Locator/ID Separation Protocol
Link State Routing
Link State Vector Routing
Mobile Ad-hoc Networks
Multiprotocol Label Switching
Network Virtualization Overlays
Pseudowire And LDP-enabled Services
Path Computation Element
Protocols for IP Multicast
Reliable and Available Wireless
Routing In Fat Trees
Routing Over Low power and Lossy networks
Routing Area Working Group
Service Function Chaining
Source Packet Routing in Networking
Traffic Engineering Architecture and Signaling

Applications and Real-Time Area (art)

General Area (gen)

Operations and Management Area (ops)

Security Area (sec)

Internet Area (int)

Routing Area (rtg)

Transport Area (tsv)

Routing Area Working Group (rtgwg)

[About](#) [Documents](#) [Meetings](#) [History](#) [Photos](#) [Email expansions](#) [List archive >](#) [Tools >](#)

WG	Name	Routing Area Working Group
	Acronym	rtgwg
	Area	Routing Area (rtg)
	State	Active
	Charter	charter-ietf-rtgwg-05 Approved
	Dependencies	Document dependency graph (SVG)
	Additional Resources	- Issue tracker - Wiki
Personnel	Chairs	Chris Bowers Jeff Tantsura
	Area Director	Martin Vigoureux
	Secretary	Yingzhen Qu
Mailing list	Address	rtgwg@ietf.org
	To subscribe	https://www.ietf.org/mailman/listinfo/rtgwg
	Archive	https://mailarchive.ietf.org/arch/browse/rtgwg/
Jabber chat	Room address	xmpp:rtgwg@jabber.ietf.org?join
	Logs	https://jabber.ietf.org/logs/rtgwg/

Charter for Working Group

The Routing Area working group (RTGWG) is chartered to provide a venue to discuss, evaluate, support and develop proposals for new work in the Routing Area and may work on specific small topics that do not fit with an existing working group.

<https://datatracker.ietf.org/wg/rtgwg/about/>



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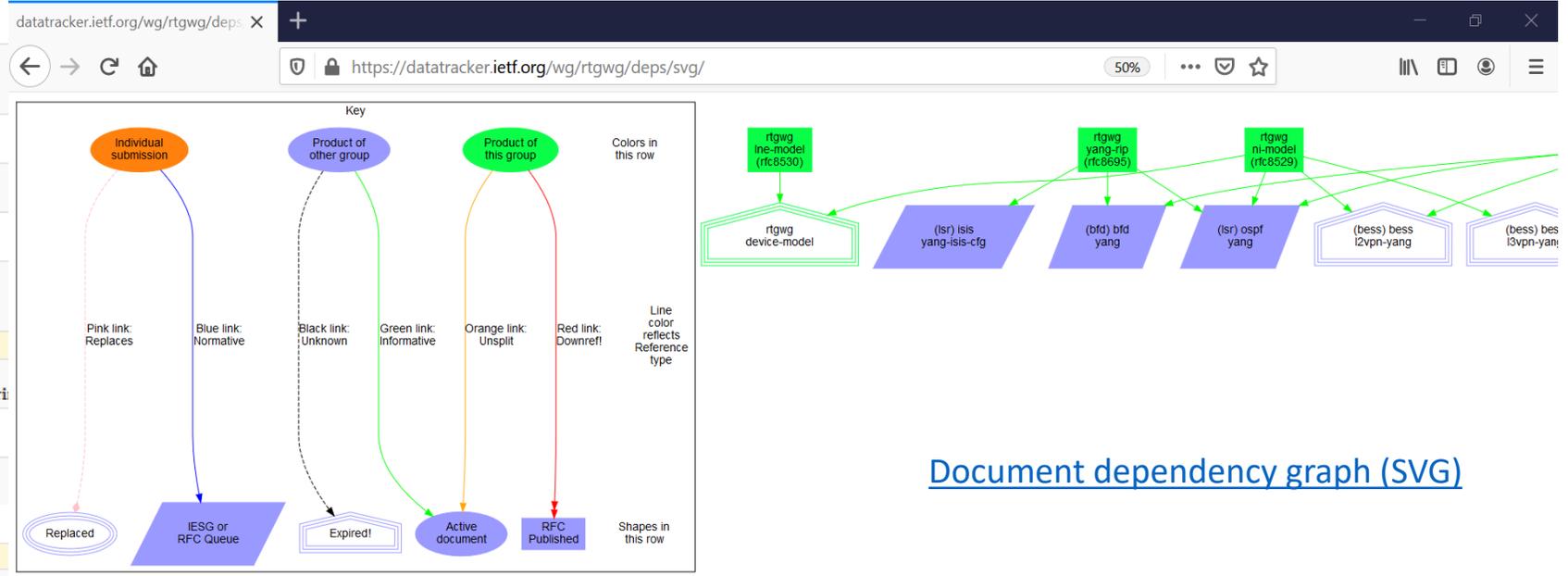


3



1

Document	Date	Status
Active Internet-Drafts (9 hits)		
draft-ietf-rtgwg-atn-bgp-06 A Simple BGP-based Mobile Routing System for the Aeronautical Telecommunications Network	2020-06-30 22 pages	I-D Exists WG Document
draft-ietf-rtgwg-bgp-pic-12 BGP Prefix Independent Convergence	2020-08-12 30 pages	I-D Exists In WG Last Call:Informations Reviews: genart, iotdir, opsdi
draft-ietf-rtgwg-net2cloud-gap-analysis-07 Networks Connecting to Hybrid Cloud DCs: Gap Analysis	2020-07-26 18 pages	I-D Exists WG Document
draft-ietf-rtgwg-net2cloud-problem-statement-11 Dynamic Networks to Hybrid Cloud DCs Problem Statement		
draft-ietf-rtgwg-policy-model-26 A YANG Data Model for Routing Policy Management		
draft-ietf-rtgwg-qos-model-02 YANG Model for QoS		
draft-ietf-rtgwg-segment-routing-ti-lfa-05 Topology Independent Fast Reroute using Segment Routing		
draft-ietf-rtgwg-srv6-egress-protection-02 SRv6 Path Egress Protection		
draft-ietf-rtgwg-yang-rib-extend-05 RIB YANG Data Model		
RFCs (27 hits)		
RFC 3906 (was draft-ietf-rtgwg-igp-shortcut) Calculating Interior Gateway Protocol (IGP) Routes Over Traffic Engineering		
RFC 5082 (was draft-ietf-rtgwg-rfc3682bis) The Generalized TTL Security Mechanism (GTSM)		
RFC 5286 (was draft-ietf-rtgwg-ippfr-spec-base) Basic Specification for IP Fast Reroute: Loop-Free Alternates		
Document		
Related Internet-Drafts (16 hits)		
draft-asechoud-rtgwg-qos-oper-model-08 YANG Model for QoS Operational Parameters		
draft-bashandy-rtgwg-segment-routing-u-loop-09 Loop avoidance using Segment Routing	2020-06-23 7 pages Expires soon	I-D Exists Reviews: rtgdir
draft-bookham-rtgwg-nfix-arch-01 An Architecture for Network Function Interconnect	2020-06-24 46 pages Expires soon	I-D Exists
draft-chen-rtgwg-srv6-midpoint-protection-03 SRv6 Midpoint Protection	2020-10-15 10 pages	I-D Exists
draft-cth-rtgwg-bgp-control-05 Architecture for Use of BGP as Central Controller	2020-07-27 20 pages	I-D Exists
draft-geng-rtgwg-cfn-dyncast-ps-usecase-00 Dynamic-Anycast in Compute First Networking (CFN-Dyncast) Use Cases and Problem Statement	2020-10-30 9 pages	I-D Exists



Document dependency graph (SVG)

Tampere University
FAST-Lab

IETF Uses Cases:

All scenarios that use INTERNET

IoT

- | | |
|-------------------------------|-------------------|
| Home/Building | Energy |
| Smart Cities | Industry 4.0 |
| Smart Transportation Vehicles | Edge Robotics |
| Healthcare | Smart Agriculture |
| Wearables | Farming |

The screenshot shows the website for the CHARM project at Tampere University of Applied Sciences. The page title is "CHARM -Challenging environments tolerant smart systems for IoT& AI (Internet of Things& Artificial Intelligence)".

Image 1: Design of multi-gas sensor for air quality monitoring in mines. The diagram shows a sensor card with a transducer array and sensor readout, connected via header connectors and separator pillars to an I2C switch + Power Source + ESP32 WiFi and a communications card.

Image 2: Prototype radar sensor mounted on a test vehicle. The image shows a person in a blue uniform working on a red and black test vehicle with a radar sensor mounted on top.

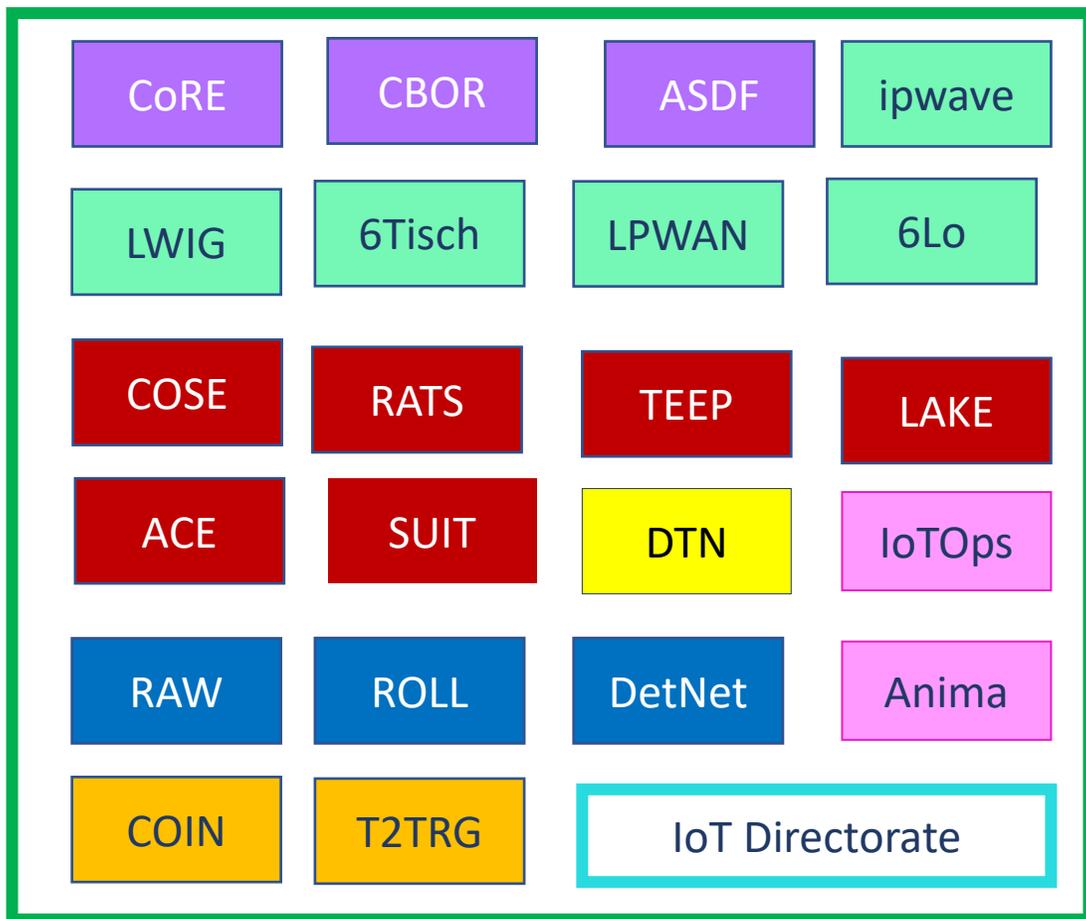
Image 3: Illustration of paper machine roll with wireless roll monitoring. The illustration shows a large cylindrical roll of paper with a sensor and antenna on its side.

Image 4: Drawing of in-service inspection robotic arm for nuclear power plant maintenance. The drawing shows a complex robotic arm with multiple joints and sensors.

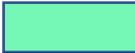
<https://charm-ecsel.eu/project/>

ECSEL Joint Undertaking logo and text: "This project has received funding from the ECSEL Joint Undertaking (JU) under grant agreement No 876362. The JU receives support from the European Union's Horizon 2020 research and innovation programme and Finland, Austria, Belgium, Czechia, Germany, Italy, Latvia, Netherlands, Poland, Switzerland." The European Union flag is also present.

Internet of Things (IoT) in the IETF



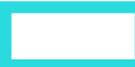
IETF Working Group Areas

-  Application Area
-  Internet Area
-  Security Area
-  Transport Area
-  Routing Area
-  Operations and Management Area

<https://datatracker.ietf.org/wg/wgname/about/>

-  IRTF

<https://datatracker.ietf.org/rg/rgname/about/>

-  IoT Directorate

<https://datatracker.ietf.org/group/iotdir/about/>

Why to participate in the IETF?

- The IETF is **Open** to any interested individual 😊
- The IETF is based on **voluntary** basis:
 - ✓ It is a **service** to the Community
- Make the Internet work better:
 - ✓ A small grain of sand to **improve the world**
- Be **up to the date** with the technologies developed for the Internet.
- You **learn** diverse set of skills.

How to participate in the IETF?

1. Find a **working group** that interest you
 - Read the **charter**
 - Read the available **documents**
<https://datatracker.ietf.org/wg/>
2. Join to the **Mailing List** of interest
 - Send **comments** to the mailing list
 - Send **reviews** of the documents of interest.

3. Join to the “**Guide Program for newcomers**”

<https://www.ietf.org/about/participate/guides/>

More information: <https://www.ietf.org/about/participate/>

How to write Internet Draft?

<https://www.ietf.org/standards/ids/>

<https://tools.ietf.org/html/rfc7322>

<https://tools.ietf.org/html/rfc7221>



Takeaways

- The IETF is **Open** to any interested individual 😊
- The IETF develops **Internet Standards** to make the Internet works better.
- One of the scenarios of IETF are the **Internet of Things (IoT)** protocols.
- The work in the IETF is performed mainly through **Mailing Lists**.
- In the IETF you are **up to the date** with the technologies that are developed for the Internet.



Thanks from

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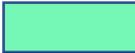
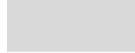


Appendix

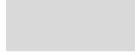
Internet of Things (IoT)



Working Group Areas

-  Application Area
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-  Transport Area
-  Routing Area
-  Operations and Management Area

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 IRTF
<https://datatracker.ietf.org/rg/rgname/about/>

 IoT Directorate
<https://datatracker.ietf.org/group/iotdir/about/>

IPv6

Connectivity over
constrained networks

6Lo

IPv6 over Networks of
Resource-constrained
Nodes

Connectivity in TSCH mode of
IEEE 802.15.4e

6Tisch

IPv6 over the TSCH mode of
IEEE 802.15.4e

Connectivity in
Low-Power Wide-Area
Networks

LPWAN

IPv6 over Low Power
Wide-Area Networks

To establish direct and secure
connectivity between vehicles

ipwave

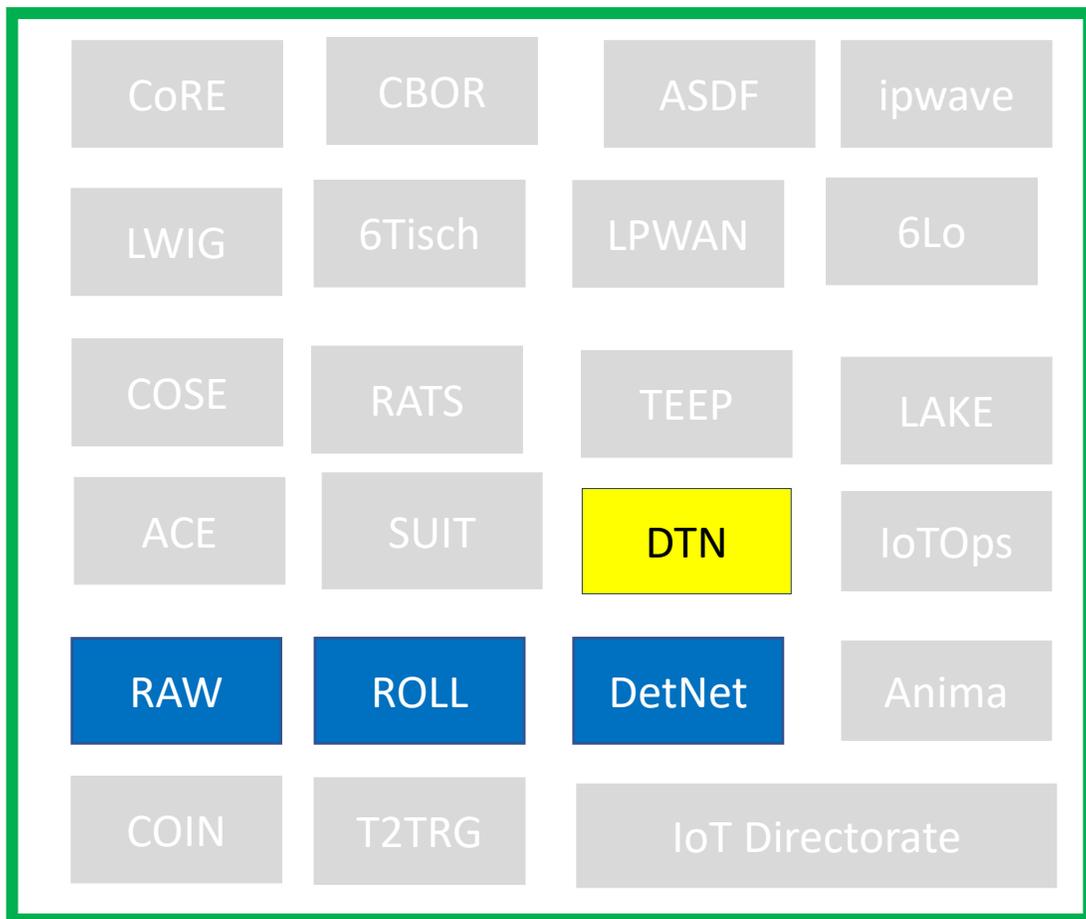
IP Wireless Access in
Vehicular Environments

Collect experiences from implementors

LWIG

Light-Weight Implementation Guidance

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IPv6

Routing in constrained networks

ROLL

High reliable and available connectivity over wireless

RAW

Deterministic data paths

DetNet

Routing Over Low power and Lossy networks

Reliable and Available Wireless

Deterministic Networking

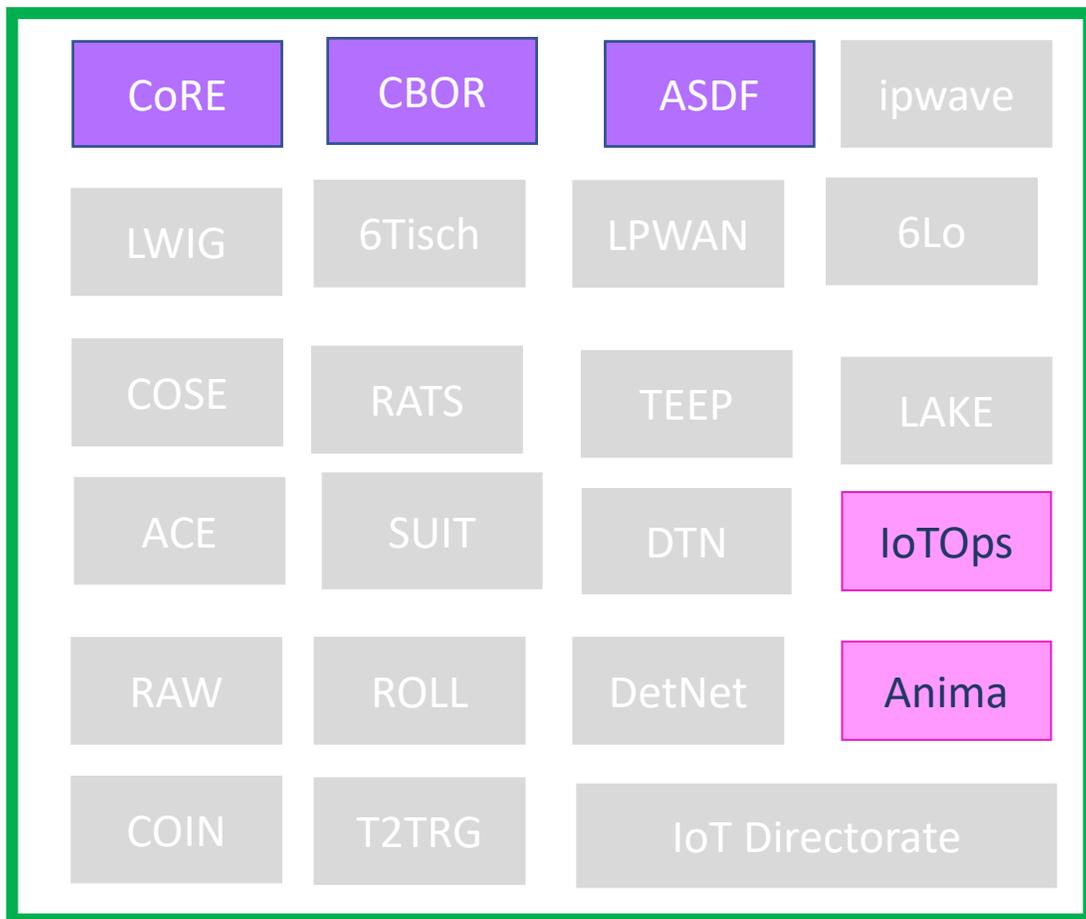
Transport Area

Data communications in the presence of long delays and/or intermittent connectivity

DTN

Delay/Disruption Tolerant Networking

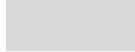
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 Application Area

Manipulate resources in
constrained networks

CoRE

Constrained RESTful
Environments

Binary data format for data
interchange

CBOR

Concise Binary Object Representation
Maintenance and Extensions

Thing interaction and data modeling

ASDF

A Semantic Definition Format for Data and
Interactions of Things

 Operations and Management Area

Operational issues in IoT

IoTops

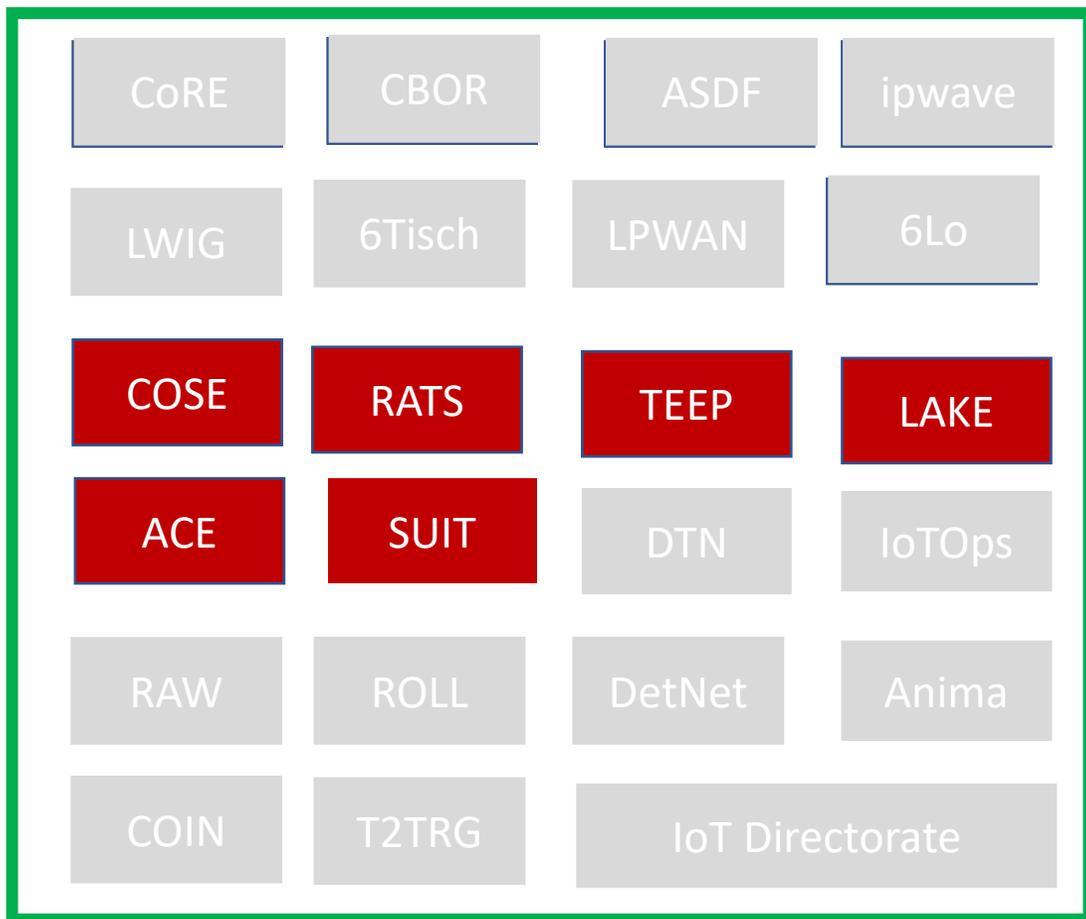
IoT Operations

Automated network management

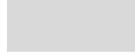
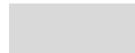
Anima

Autonomic Networking Integrated
Model and Approach

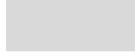
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Security Area

Authentication and Authorization in IoT

ACE

Authentication and Authorization for Constrained Environments

Security mechanisms for binary data format

COSE

CBOR Object Signing and Encryption

Key Exchange in Object Security for RESTful Environments

LAKE

Lightweight Authenticated Key Exchange

Way to specify evidence to assess trustworthiness

RATS

Remote ATtestation Procedures

Firmware Update in IoT

SUIT

Software Updates for Internet of Things

Provide Trusted Executed Environments for lifecycle device management

TEEP

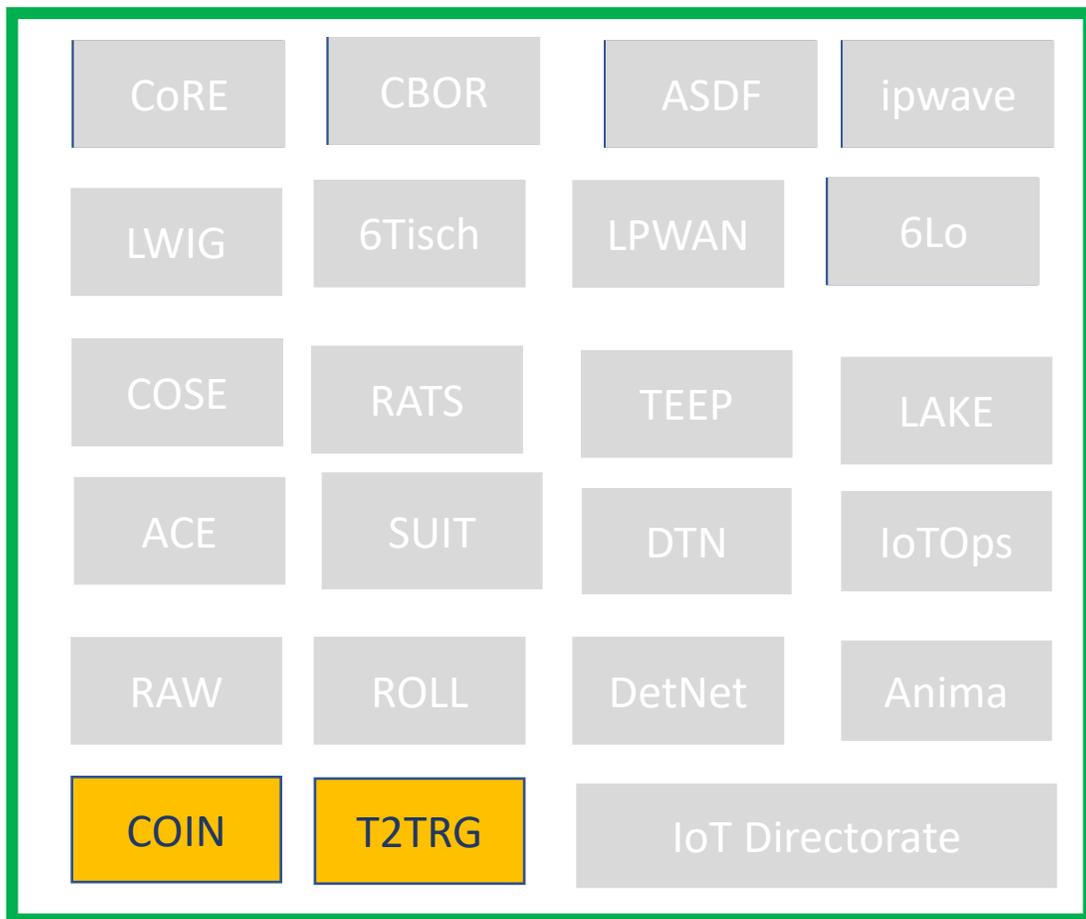
Trusted Execution Environment Provisioning

Mailing List no WG

PidLoc

Secure End to End Privacy in Identifier-Locator split (PidLoc) approaches

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<https://datatracker.ietf.org/group/iotdir/about/>

In-network compute at the Edge

 COIN

Computing in the Network Research Group

Open Research Issues in IoT

 T2TRG

Thing-to-Thing Research Group