IRTF and NMRG in a nutshell
IFIP/IEEE M 2021, Online

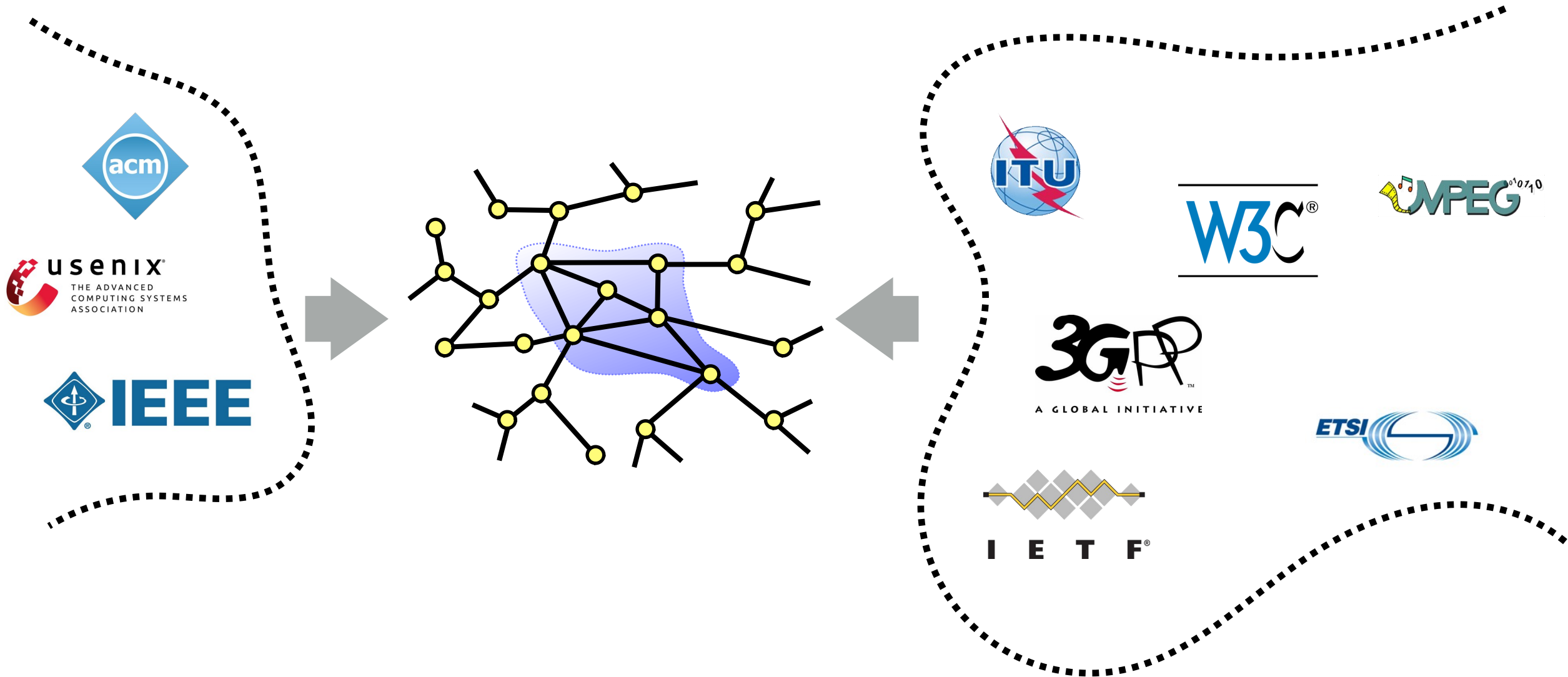Laurent Ciavaglia, Jérôme François

Questions we will try to answer today

- What is IRTF ?

- What are the differences with IETF?

- Why should I contribute to IETF or IRTF?

- What is the difference with an academic conference?

- What are the objectives and activities of NMRG?

- In practice, how can I contribute?

IETF & IRTF

Research and Standards: Different Worlds?

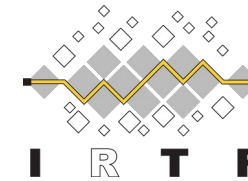# Why Should Researchers Contribute to Standards?

To help make the network work better

Because your research might be useful – and
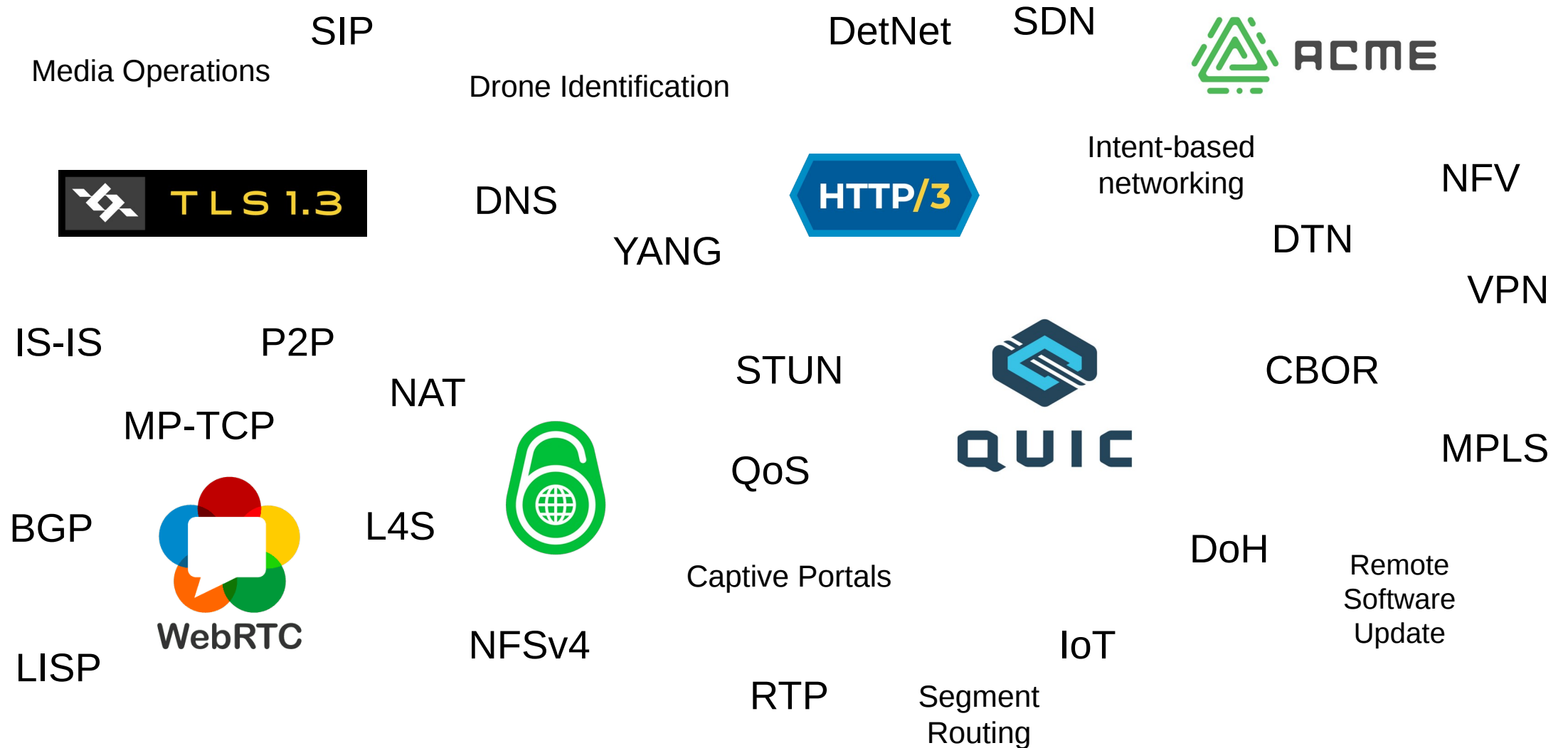could change systems people actually use

Because you might learn something – making contacts
with industry is a great way to find the real problems!

To keep industry honest – a neutral point of view to evaluate
the technology, with no business agenda to promote

How to contribute?

IETF Standards Activities

SIP

DetNet   SDN

ACME

Media Operations

Drone Identification

Intent-based networking

NFV

TLS 1.3

DNS

HTTP/3

DTN

YANG

VPN

IS-IS   P2P

STUN

CBOR

NAT

MP-TCP

QUIC

MPLS

QoS

BGP   L4S

DoH

Captive Portals

Remote Software Update

WebRTC

NFSv4

IoT

LISP

RTP   Segment Routing

How to IETF?

Research

Community

Working Group

Review

RFC Publication

- Solve a problem of relevance to the standards community

- Check if the IETF is interested in your work

- Develop your ideas in an IETF working group

- …

- Profit…?

When to Bring Work to the IETF?

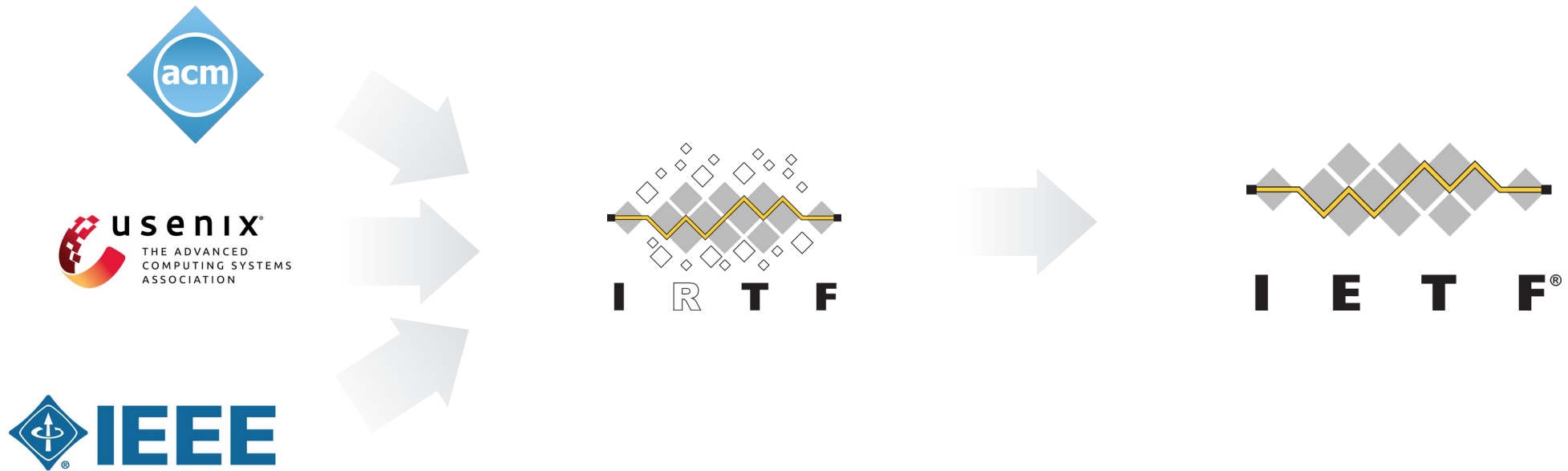**Research**

Community

Working Group

Review

RFC Publication

- Don't start too early – **IETF is not a place to do research**

- Once you think you've solved problem that fits one of the IETF's work areas and aligns with architectural principles of the Internet, **only then** bring the work to IETF
  - When the scope is well defined and the problem understood
  - When the research is largely complete, and engineering is needed
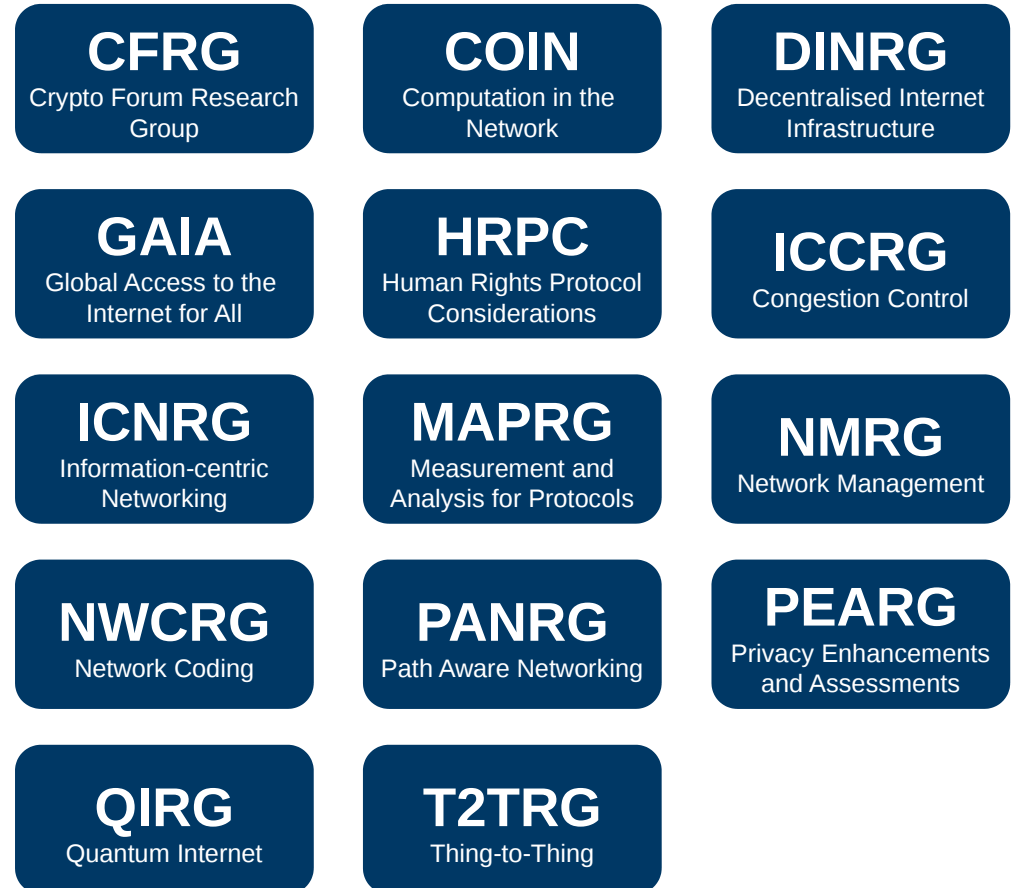 - When you know your idea is sound, and want to see it used

What About Research?

- The Internet Research Task Force (IRTF) promotes evolution of the Internet through applied, longer-term, research on Internet protocols, applications, architectures, and technology

IRTF Activities

- Organized around longer-term research groups

- A forum where researchers and engineers can explore the feasibility of research ideas

  - You have a good idea, and it works in simulations and in a lab testbed – will it work in the real-world Internet? Is it deployable? Implementable on real hardware?

  - How does the network *really* work? How does that affect your research?

- A venue where researchers can learn from the engineers who build and operate the Internet – and where the standards, implementation, and operations community can learn from research

CFRG
Crypto Forum Research Group

COIN
Computation in the Network

DINRG
Decentralised Internet Infrastructure

GAIA
Global Access to the Internet for All

HRPC
Human Rights Protocol Considerations

ICCRG
Congestion Control

ICNRG
Information-centric Networking

MAPRG
Measurement and Analysis for Protocols

NMRG
Network Management

NWCRG
Network Coding

PANRG
Path Aware Networking

PEARG
Privacy Enhancements and Assessments

QIRG
Quantum Internet

T2TRG
Thing-to-Thing

Supporting Applied Networking Research

- ACM/IRTF Applied Networking Research Workshop
  - A forum for researchers, vendors, network operators and Internet standards community to present and discuss emerging results in applied networking research
  - Peer-reviewed academic workshop – papers in ACM Digital Library
  - Co-locates with IETF meeting in July – travel grants available (when travel resumes, post-COVID)
  - **https://irtf.org/anrw/**

Applied Networking Research Workshop

Supporting Applied Networking Research

- **Applied Networking Research Prize** is "awarded to recognize the best recent results in applied networking, interesting new research ideas of potential relevance to the Internet standards community, and upcoming people that are likely to have an impact on Internet standards and technologies, **with a particular focus on cases where these people or ideas would not otherwise get much exposure or be able to participate in the discussion**"

- Nomination deadline usually in November

- Cash prize + invitation at the IETF + invited talk

- **https://irtf.org/anrp/**

NMRG

Network Management Research Group

In a nutshell

A forum for researchers to explore new technologies for the management of the Internet

The NMRG is expected to identify and document requirements, to survey possible approaches, to consider new architectural frameworks, to provide specifications for proposed solutions, and to prove concepts with prototype implementations that can be tested in large-scale real-world environments.

https://datatracker.ietf.org/rg/nmrg/about/

- Started in **1999 (!)** with successive waves (management technologies, autonomic network management and…) ⇨ mid-term objectives **regularity updated thanks to participants' propositions and interests**

Current activities

- **Overarching theme: Self-driving/-managing networks**
  - Interfaces between human and self-driving networks ⭢ **Intent-based networking (IBN)**
  - Intelligent mechanisms to decide actions ⭢ (not limited to) **AI**

IBN

1. Problem statement, goals, challenges
2. Fundamental concepts & terminologies
3. Taxonomy of intents
4. Architecture framework
5. Validation scenario
6. Implementations and PoC
7. Integrability and interoperability

Intent-Based Networking - Concepts and Definitions
(Target: informational RFC)
- Our own definition:
  - Intent = declaration of operational goals (declare the outcome)
  - Intent ≠ policy
- Core functionalities and life cycle

Intent classification (Target: informational RFC)
- Three main intent solutions: carrier network, DC, enterprise
- A general methodology to classify intents (identify users, type, scope, abstraction…)

Discussion on going on architecture driven by uses cases
- Measurement, slicing, interconnection
- WIP, effort under consolidation (want to join?)

Hackathon @ IETF 108: multi-level approach to IBN
(slice intent setup + multiple service chain intents setup)

Artificial Intelligence in Network Management

1. Document major research challenges in AI for network management

2. Organization of a practical competition

3. Support discussion and collaboration (open forum)

Artificial Intelligence in Network Management (target: white paper or informational RFC)

- Collaborative document
- Involve NM and AI experts
- List of challenges (not use cases)
  - Can reflect common AI issue but with the networking perspective (acceptability, explainability, mapping, …)
  - AI for taking decisions (network operations)
  - Bi-directional coupling AI-NM
- **WIP under consolidation, open for new contributors, participate to the panel wednseday morning**

Regular technical talks

- derived from conferences an easy to start getting in touch with the group
- Our plan is to organize a webinar series (even with other groups)

Self-Driving/-Managing Networks

1. Debate on new architectural framework (survey, gap analysis, requirements…)

2. Investigate and document reference models and de-facto best practices

 Allow to position the group in the NM ecosystem and evolve if necessary

Different topics proposed / presented
- Event Condition Action (ECA) policy management (IETF NETMOD)
- Digital twins
- Residual configuration

Summary

- **Two core topics but open to propositions and looking for new comers**
  - IBN: consolidate use cases and architecture proposition
  - AI: consolidate challenges, organize/present technical talk seminars
- **Various types of contributions and outcome**
  - Draft / RFC (but not the only output)
  - Research/technical presentations (make your work visible to the IETF community as well)
  - Hackathon / PoC (joint implementation)
  - ....
- **In practice:**
  - Start here: https://datatracker.ietf.org/rg/nmrg/about/ (access to the documents, mailing list..)
  - Subscribe to the mailing list
  - Collocated (physical) meetings with the IETF week (fee waiver) + interim virtual meeting (no fee)
  - Any idea, questions, would like to propose something □ contact us (nmrg-chairs@irtf.org)

- **Next meetings**: interim in June, IETF in July