Short introduction into OmniRAN P802.1CF

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Authors:

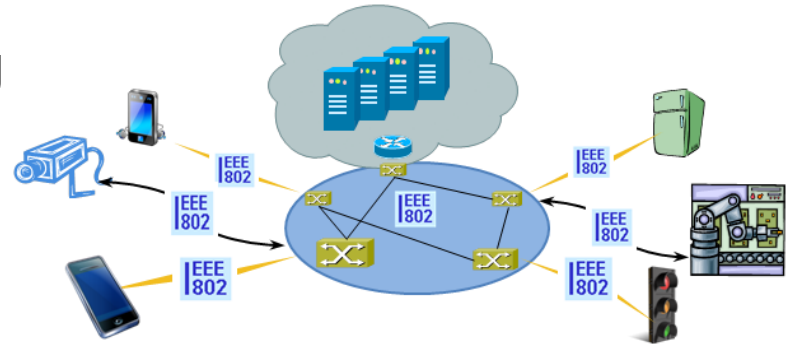| Name	Affiliation	Phone	Email
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Abstract

The presentation provides an introduction into the scope and approach of the P802.1CF project and asks for support by subject matter experts of the IEEE 802 WGs.

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Short introduction into OmniRAN P802.1CF

Max Riegel, Nokia Networks
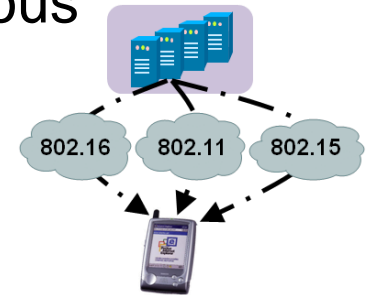## (Chair IEEE 802.1 OmniRAN TG)

There is evidence to consider commonalities of IEEE 802 Access Networks

- **More (huge) networks are coming up by everything gets connected**
  - e.g. SmartGrid, ITS, IoT, …
- **New markets for IEEE 802 access technologies**
  - e.g. factory automation, in-car communication, home automation, …
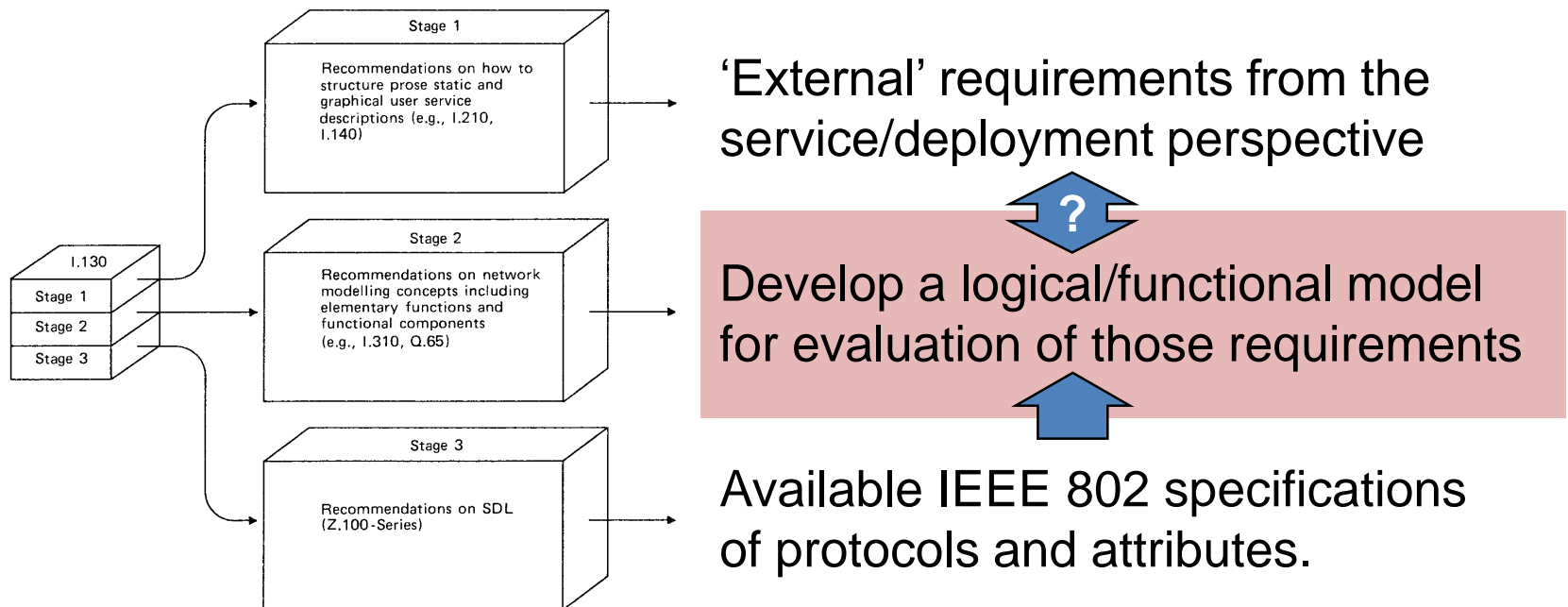- **IEEE 802 access is becoming more heterogeneous**
  - multiple network interfaces
    - e.g. IEEE 802.3, IEEE 802.11, IEEE 802.15…
  - multiple access network topologies
    - e.g. IEEE802.11 in residential, corporate and public
  - multiple network subscriptions
    - e.g. multiple subscriptions for same interface
- **New emerging techniques, like SDN and virtualization**

OmniRAN P802.1CF provides a kind of 'Stage 2' Specification for IEEE 802

- The ITU-T defined in its Rec. I.130 a sequential 3 stage process, which is nowadays commonly used in most telecommunication network standardization activities.

Stage 1

Recommendations on how to structure prose static and graphical user service descriptions (e.g., I.210, I.140)

I.130
Stage 1
Stage 2
Stage 3

Stage 2

Recommendations on network modelling concepts including elementary functions and functional components (e.g., I.310, Q.65)

Stage 3

Recommendations on SDL (Z.100-Series)

'External' requirements from the service/deployment perspective

?

Develop a logical/functional model for evaluation of those requirements

Available IEEE 802 specifications of protocols and attributes.
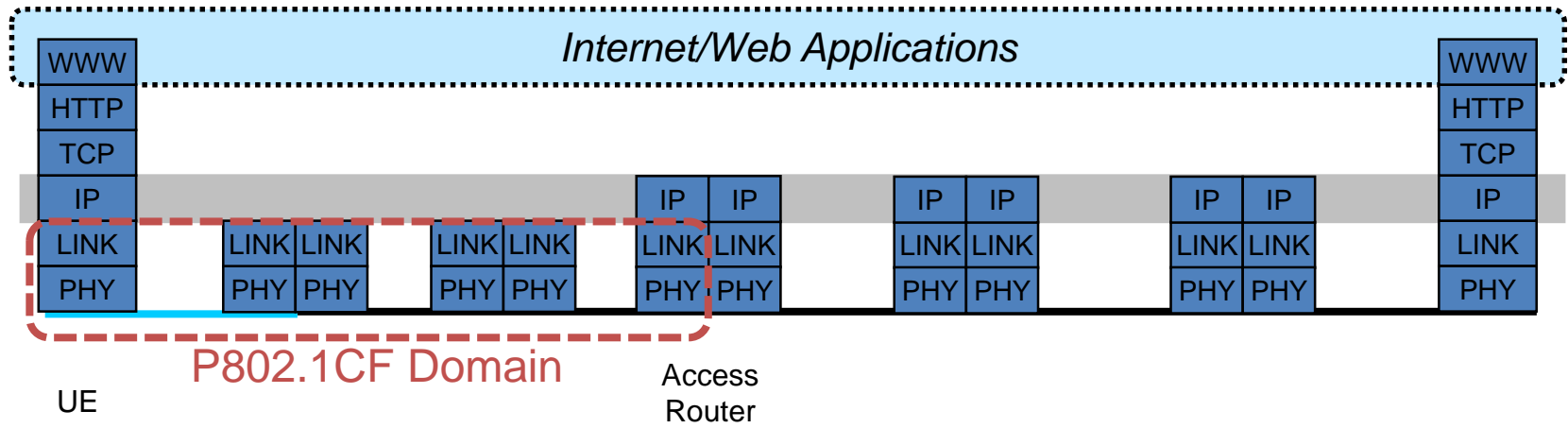
- A 'Stage 2' specification provides a mapping of the existing IEEE 802 protocols to a functional network model, which facilitates easier evaluation and better understanding of end-to-end behavior.

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P802.1CF in the big picture of the Internet
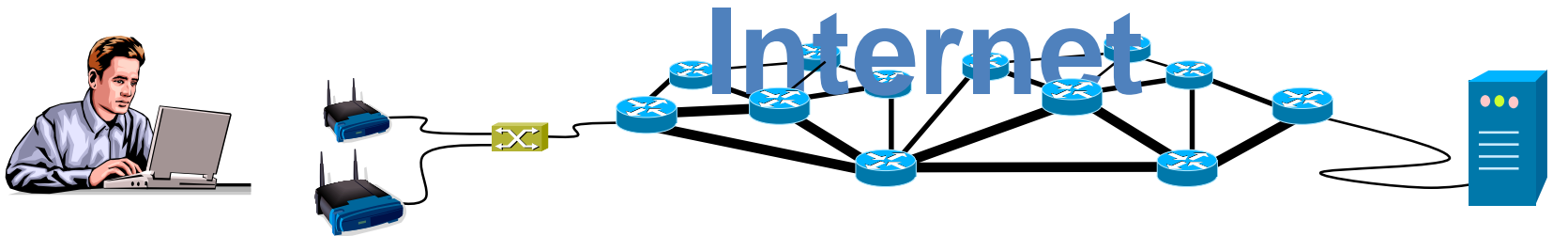
Key constraints for P802.1CF

- Reverse engineering of a 'Stage 2' document based on the existing IEEE 802 protocols
  - Show, how the IEEE 802 protocols fit together
  - Show, that required functionality is available
  - Gaps in existing IEEE 802 protocols may appear, but its up to the responsible 802 WGs to fill them
- Recommended Practice
  - It provides common understanding however does not exclude other solutions
  - It may lead to better alignment of capabilities of IEEE 802 access technologies (wired as well as wireless)
- Aim is to sharpen the understanding of IEEE 802 for the deployment in access networks
  - Provide a kind of cookbook to network engineers
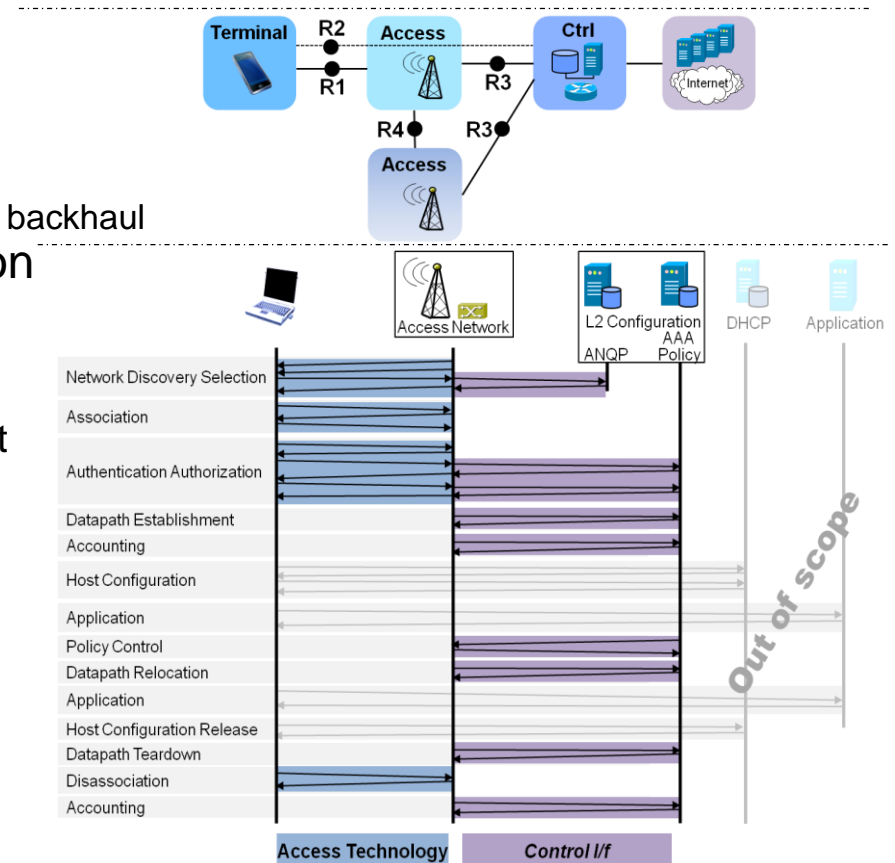 - Provide a reference specification to other organizations and operators

P802.1CF Project Authorization Request

- **Project Title:**
  Network Reference Model and Functional Description of IEEE 802 Access Network

- **Scope:**
  This Recommended Practice specifies an access network, which connects terminals to their access routers, utilizing technologies based on the family of IEEE 802 Standards by providing an access network reference model, including entities and reference points along with behavioral and functional descriptions of communications among those entities.

- **Purpose:**
  Heterogeneous networks may include multiple network interfaces, multiple network access technologies, and multiple network subscriptions. In some cases such heterogeneous functionality must be supported in a single user terminal.
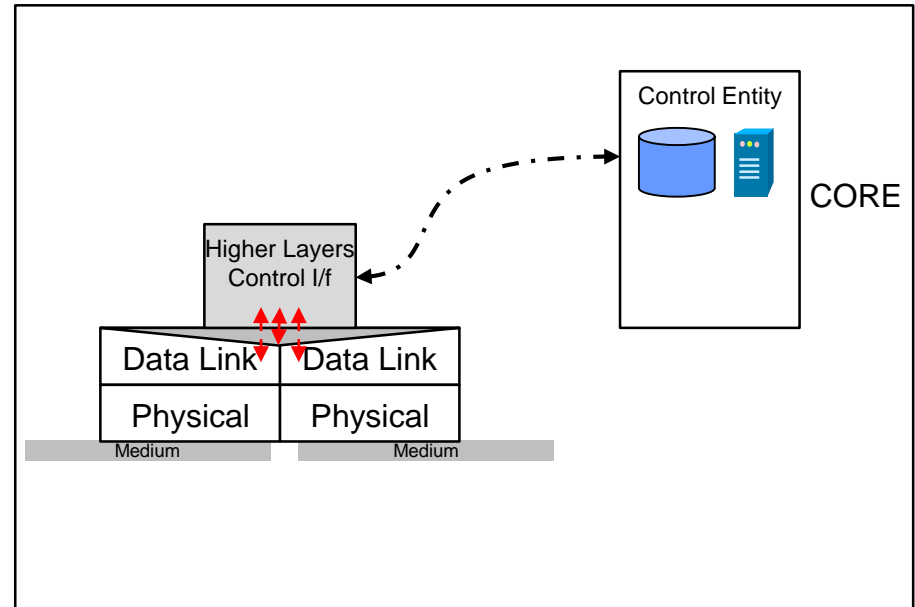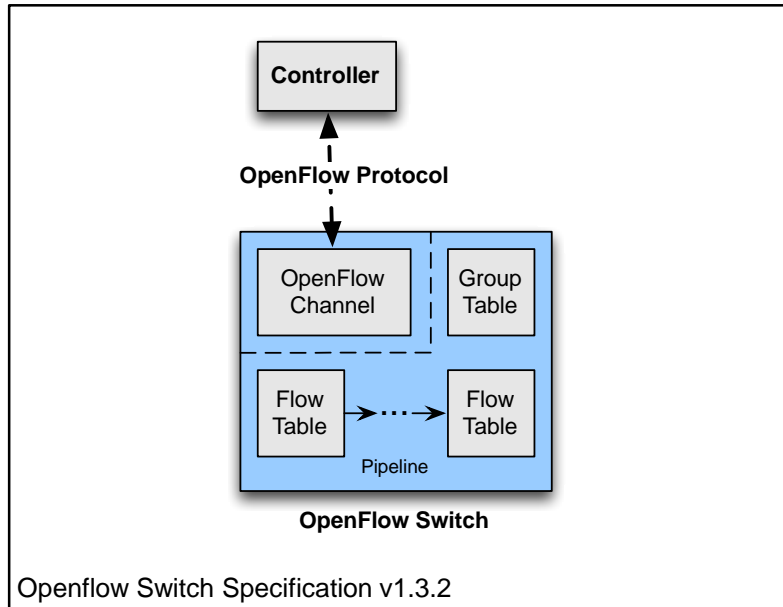
  This Recommended Practice supports the design and deployment of access networks based on IEEE 802 technologies, guides the developers of extensions to the existing standards in support of a heterogeneous access network, and enables the use of IEEE 802 standards in new network deployments by specifying the functions of the IEEE 802 technologies when deployed in access networks.

P802.1CF Draft ToC

- Introduction and Scope
- Abbreviations, Acronyms, Definitions, and Conventions
- References
- Identifiers
- Network Reference Model
  - Overview
  - Reference Points
  - Access Network Control Architecture
    - Multiple deployment scenarios including backhaul
- Functional Design and Decomposition
  - Dynamic Spectrum Access
  - Network Discovery and Selection
  - Association and Disassociaiton
  - Authentication and Trust Establishment
  - Datapath establishment, relocation and teardown
  - Authorization, QoS and policy control
  - Accounting and monitoring
- *SDN Abstraction*
  - *Terminal*
  - *Access Network*
- Annex:
  - Tenets (Informative)

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SDN is part of OmniRAN P802.1CF

Controller

OpenFlow Protocol

OpenFlow Channel

Group Table

Flow Table

Flow Table

Pipeline

OpenFlow Switch

Openflow Switch Specification v1.3.2

Control Entity

CORE

Higher Layers Control I/f

Data Link

Data Link

Physical

Physical

Medium

Medium

- Common understanding of SDN is aligned to the same architectural model as used by OmniRAN.

- Access networks have always been a kind of 'software defined' network.

Example Chapter Structure

- Functional Design and Decomposition
  - Dynamic Spectrum Access
  - Network Discovery and Selection
    - Generic functional requirements and information flows
    - Ethernet functional design   <- 802.3
    - WPAN functional design   <- 802.15
    - WLAN functional design   <- 802.11
    - WMAN functional design   <- 802.16
    - WRAN functional design   <- 802.22
  - Association and Disassociaiton
  - Authentication and Trust Establishment
  - Datapath establishment, relocation and teardown
  - Authorization, QoS and policy control
  - Accounting and monitoring

NDS Functional Requirements

- IEEE 802 network discovery and selection should support more complex scenarios:
  - Multiple access technologies
  - Multiple different access networks
  - Multiple subscriptions
  - Specific service requirements
  - No a-priori knowledge about offered services
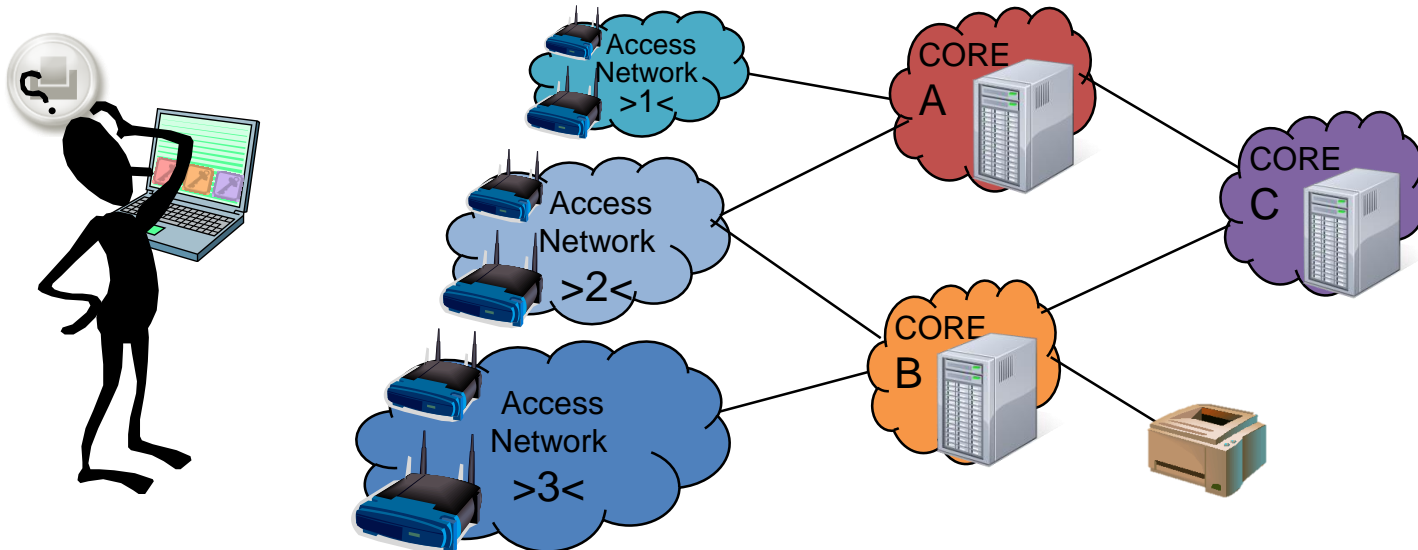
Network Discovery and Selection Functions

- A process which allows a station to retrieve the list of all access network interfaces in reach by
  - Passive scanning
  - Active scanning
  - Data base query
- Retrieving supplementory information for each of the access network interfaces to learn about
  - Identity of the access network
  - Supported Subscriptions
  - Supported Services
- Some algorithm in the station, which processes all the retrieved information, for determination of the 'best' access network interface to connect to.

NDS Roles and Identifiers

- User
  - One or more Subscriptions
    - Subscription Identifier {NAI} + Subscription Name {String}
- Terminal
  - Station
    - STA {EUI-48}
- Access Network
  - One or more Access Network Interfaces
    - ANI {EUI-48}
  - Access Network
    - AN Identifier {EUI-48} + AN Name {String}
  - Supported Subscription Services
  - Supported User Services
  - Access Network Capabilities
    - Record of capabilities {t.b.d. (ANQP???}
- CORE
  - Subscription Service – 'Termination point of AAA'
    - SSP Identifier {FQDN} + SSP Name {String}
  - User Service – 'Termination point of IEEE 802 user plane'
    - USP Identifier {???} + USP Name {String}

NDS Technology Specific Design

		802.3	802.11	802.15	802.16	802.22
Identifiers	STA	EUI-48	EUI-48	EUI-64	EUI-48	EUI-48
	ANI	EUI-48	EUI-48	EUI-64	EUI-48	EUI-48
	AN-id	???	EUI-48	???	EUI-48	EUI-48
	AN-name	256 Char	30 Char	???		
Subscriptions		NAI	NAI/PSK	???/PSK	NAI	NAI
Multiple COREs		Info	ANQP	-	?	-
Discovery process		manual	passive, active	passive, active	passive	passive

- A specific section for each of the IEEE 802 access technologies should explain, how the generic requirements are supported and realized.
  - It would be great, if references into the specifications would be provided.

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Conclusion

- The P802.1CF specification provides a kind of functional framework across all IEEE 802 access technologies.

- OmniRAN would like to engage subject matter experts of the 802 WGs for contributions on the particular access technologies.
  - We will provide a kind of template to keep your efforts low

- A thorough review should be performed by the WGs to ensure that the access technology specific content of P802.1CF is correct.

Looking forward to next session in Athens, September 15-18

- Envisioned topics:
  - Refinement of Network Reference Model
  - Review revision of text on dynamic spectrum access
  - Network Detection and Selection /w review by other WGs
  - Multiple IEEE 802 interfaces on the same link – what are the issues?
  - Which of the IEEE 802.15 interfaces can apply to 802.1CF?
  - Revision of SDN contribution text
  - Project development schedule

- Conference calls on September 4th and October 21st, 10:00AM ET

- Announcements and dial-in details on OmniRAN TG Wiki page on mentor https://mentor.ieee.org/omniran/bp/StartPage