



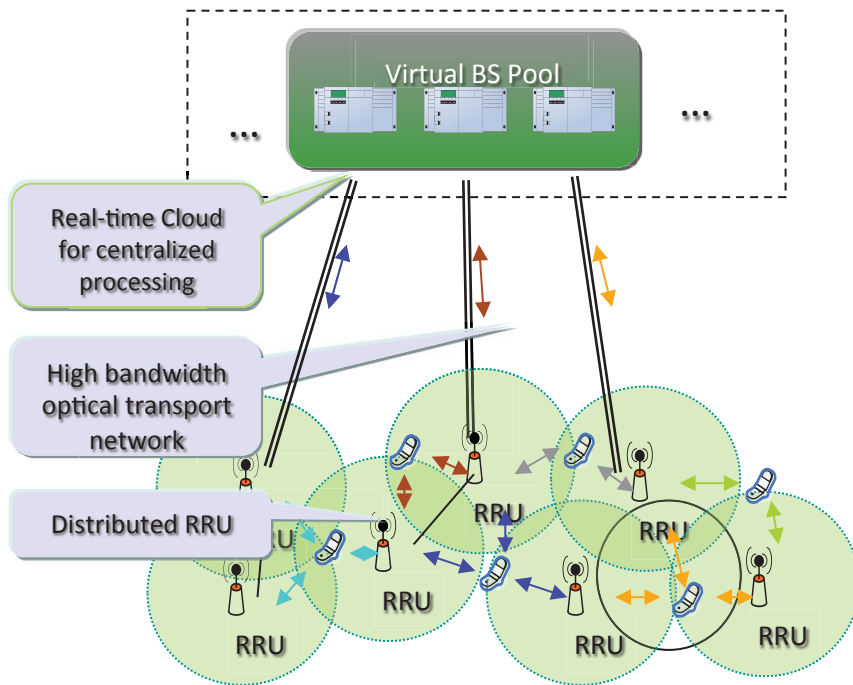
PAR for Next Generation Fronthaul Interface (NGFI)

CMCC, AT&T, SK telecom, Telecom Italia,
Alcatel-Lucent, Broadcom, Intel

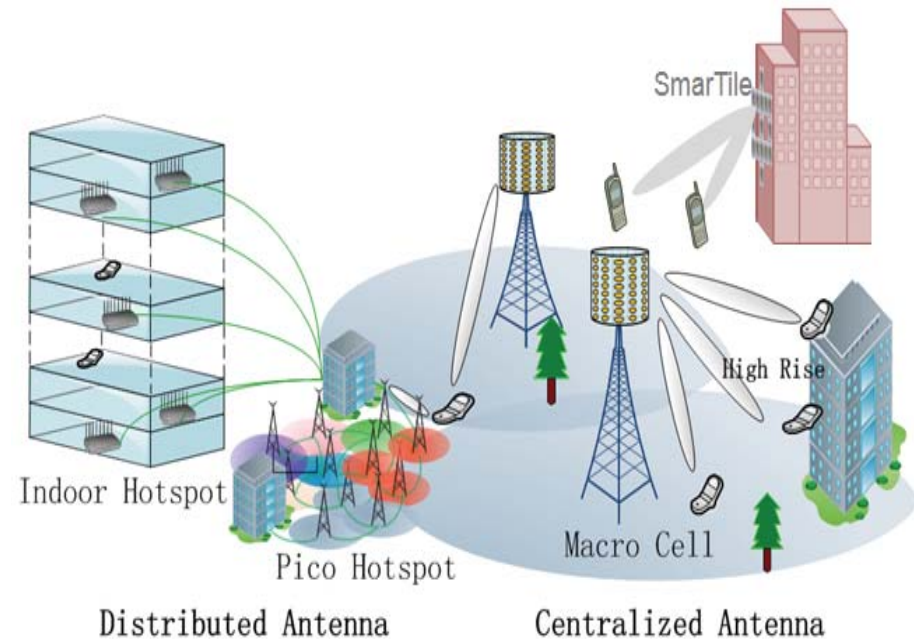
- ❑ A proposal for a new WG called NGFI WG now under review by NesCom
- ❑ It is about fronthaul for 5G
- ❑ Started in IEEE 5G rapid promotion meeting in May
- ❑ Co-founding members: China Mobile, AT&T, Telecom Italia, SK telecom, Broadcom, Intel and Alcatel-Lucent
- ❑ Companies showing great interest: Verizon, KDDI, Orange, Nokia, Fujitsu etc.
- ❑ The purpose of this report: for information & call for more attention

Motivation for the WG

Efficient FH interface is critical to support key technologies for both 4.5G and 5G such as C-RAN, massive MIMO, UDN etc.

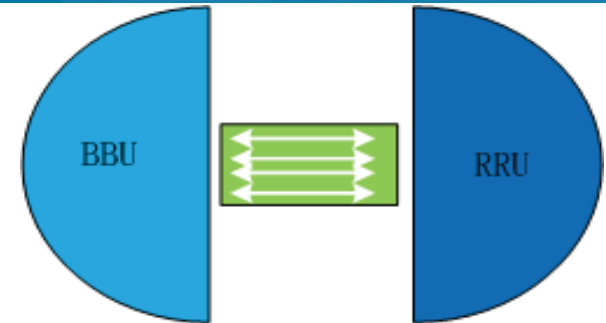


Fronthaul has been a concern to C-RAN large-scale realization (9.8Gbps per TD-LTE carrier with 20Mhz BW and 8 antennas)



The increase of antenna number in massive MIMO leads to extremely high data rate for FH (e.g., 160Gbps for 128 antennas)

CPRI: Common Public Radio Interface, most used FH interface to connect BBU and RRU



Main features of CPRI

Mainly point-to-point connection

High bandwidth

SDH-alike transmission mode

Traffic independent & antenna-dependent

Major shortcomings



Inflexible networking



Low transmission efficiency

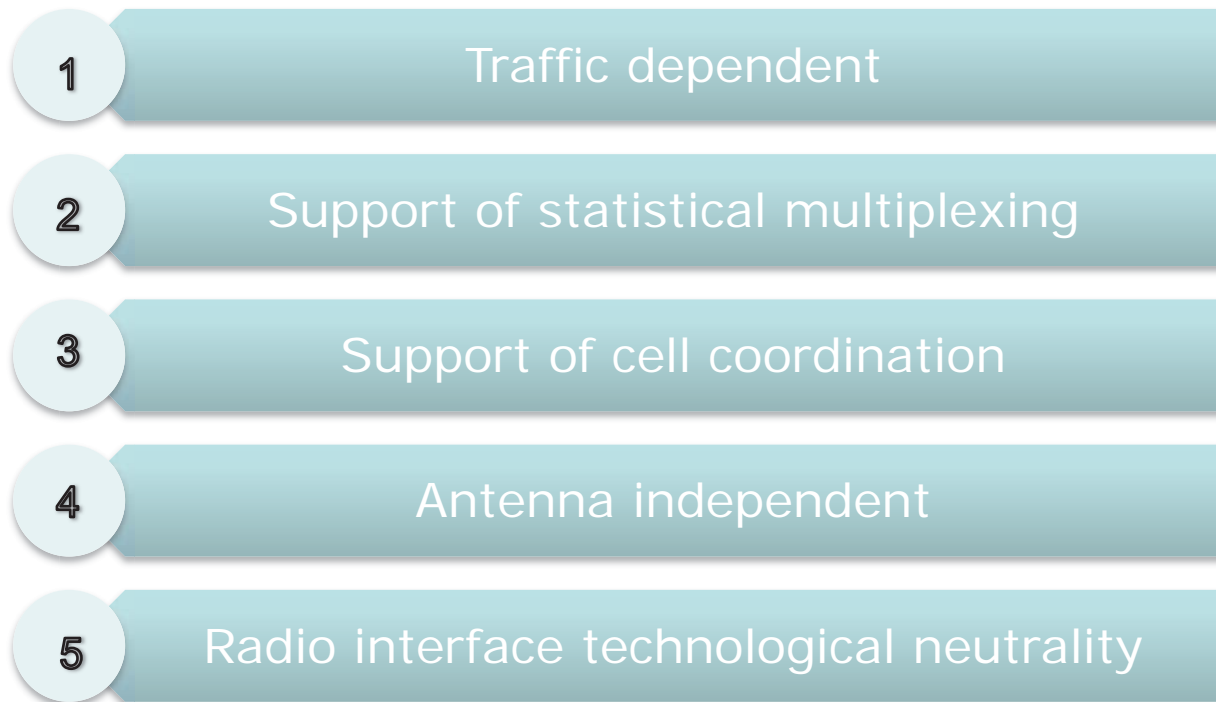


High consumption of transport resources (wavelength, fiber, etc.)



Insufficient OAM & protection capabilities

FH with low-efficiency, inflexibility and poor scalability



- The key to achieve FH interface redesign lies in the function re-split b/w BBU and RRU
- The new NGFI will further lead to re-design of underlined transport networks with packet switching capability

□ Clarity in PAR Content and Title

NesCom shall only approve PARs where the title, scope and purpose are sufficiently unambiguous, as to be understandable by a NesCom member not from the society that submitted the PAR. All acronyms shall be spelled out at first use.

□ Scope and Purpose of the PAR

The scope and purpose of the PAR shall be written in complete sentences and with proper grammar. The scope and purpose should be distinct and separate statements. References to other standards within the scope and purpose shall include the number, title, date (if appropriate), and source of the referenced standards. For PARs approved after 01 January 2007 for new or revised standards, the scope and purpose (if applicable) must match the scope and purpose clauses of the draft document submitted to RevCom. A purpose clause is not mandatory. If the document will not contain a purpose clause, this should be noted on the PAR form.

1.1	Assigned Number	N/A
1.2	Type of Document	Standard
1.3	Life Cycle	Full Use
2.1	Project Title <i>The title shall not contain the acronym "IEEE". This is added to the title when the standard publishes. All other acronyms shall be spelled out in the title.</i>	Standard for Packet-based Fronthaul Transport Networks
3.1	Working Group	Next Generation Fronthaul Interface (NGFI)
3.2	Sponsoring Society And Committee	IEEE Communications Society, Standards Development Board
3.3	Joint Sponsor	N/A
4.1	Sponsor Balloting Information	N/A
4.2	Expected Date Of Submission	December, 2017

4.3	Projected Completion Date For Submittal To RevCom:	August 2018
5.1	Approximate Number Of People Expected To Be Actively Involved In The Development Of This Project	40
5.2	Scope of Proposed Standard <i>NOTE: The Scope in the draft standard as submitted to RevCom must match the Scope of the PAR. The submittal should clearly and concisely define the scope of the standard, employing proper grammar. The scope generally describes "what" will be done (i.e., the technical boundaries of the standard). All acronyms should be spelled out at first use. Any documents listed in the Scope should include the title and (if appropriate) date of the document.</i>	<p>This standard will specify:</p> <ol style="list-style-type: none"> 1. Architecture for the transport of mobile fronthaul traffic (e.g. Ethernet-based), user data traffic, and management and control plane traffic. 2. Requirements and definitions for the fronthaul link, including data rates, timing and synchronization, and quality of service. <p>The working group will also recommend different functional partitioning between Remote Radio Units (RRUs) and base-band units (BBUs) that will improve fronthaul link efficiency and interoperability among various vendors, and that will facilitate the realization of cooperative radio functions, such as massive Multiple-Input-Multiple-Output (massive MIMO) operational modes, Coordinated Multi-Point (CoMP) transmission and reception, etc.</p>

5.3	Is The Completion Of This Standard Contingent Upon The Completion Of Another Standard? <i>Your explanation should include how the standard is dependent upon the completion of another standard. Also, if applicable, why a PAR request is being submitted if the standard currently under development is not yet complete. The title and number of the standard which this project is contingent upon shall be included in the explanation.</i>	No
5.4	Will This Document Contain A Purpose Clause?	Yes

5.4.Yes	If Yes, Enter The Purpose Of Proposed Standard:	<p>The Fronthaul Packet Transport standard will enable the implementation of critical 5G technologies, such as massive Multiple-Input-Multiple-Output (massive MIMO), Coordinated Multi-Point (CoMP) transmission and reception, and scalable Centralized/Virtual Radio Access Network (C-RAN/V-RAN) functions.</p>
	<p><i>NOTE: The Purpose in the draft standard as submitted to RevCom must match the Purpose set forth in the PAR. All acronyms should be spelled out at first use.</i></p> <p><i>A purpose statement is encouraged but not mandatory. If the document will not include a purpose, please type "document will not contain a purpose statement" in the field. The submittal should clearly and concisely define the purpose of the standard, employing proper grammar. The purpose generally describes "why" a standard will be done. The purpose of the proposed standard should be consistent with the type of document, the title, and the scope. For example, if the type of document is "Guide for ...," it is inconsistent if the purpose states "This document describes ..."</i></p>	<p>This standard will simplify network design and operation, increase network flexibility and resource utilization, and lower cost by leveraging existing, mature Ethernet-based solutions for vital functions, such as quality of service, synchronization, and data security.</p> <p>The fronthaul architecture will provide unified management and control solution, common networking protocols, and universal network elements, thus facilitating migration to future C-RAN/V-RAN mobile networks.</p> <p>By defining the optimal functional partitioning between the RRU and the BBU, this standard will improve bandwidth efficiency, network scalability, timing and synchronization performance, and will preserve and enhance the ability to deploy cooperative radio modes.</p>

5.5	Need For The Project <i>The need for the project details the specific problem that the standard will resolve and the benefit that users will gain by the publication of the standard.</i>	<p>On the road towards future 5G networks, it is clear that an efficient transport network is necessary and traditional fronthaul solutions are not suitable for 5G evolution. The current mobile networks are comprised of multiple separate network domains. This creates serious challenges for network operators, such as low scalability, inflexible management and control solutions, slow and difficult upgrades, poor resource utilization, and high cost. This project is needed to facilitate the implementation of key 5G technologies especially Cloud-RAN and Massive multiple-input-multiple-output (MIMO) from fronthaul networking perspective, and describe the required networking architecture to enable migration to 5G and C-RAN/V-RAN solutions.</p>
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5.6	<p>Stakeholders For The Standard</p> <p><i>The stakeholders (e.g., telecom, medical, environmental) for the standard consist of any parties that have an interest in or may be impacted by the development of the standard.</i></p>	<p>Telecom operators, telecom system infrastructure providers and chipset vendors.</p>
6.1.A	<p>Is The Sponsor Aware Of Any Copyright Permissions Needed For This Project?</p> <p><i>If the proposed standard uses copyrighted material, copyright releases must be obtained by the working group and shall be included in the final package submitted to the IEEE-SA Standards Board. Additionally, remember that during development of your approved project, the proper IEEE copyright notices must be maintained on all drafts</i></p>	<p>No</p>

6.1.B	<p>Is The Sponsor Aware Of Possible Registration Activity Related To This Project?</p> <p><i>If the proposed standard requires the unique identification of objects or numbers currently administered by the IEEE (or intended to be administered by IEEE) for use in industry, this shall be indicated on the PAR form along with an explanation. An example of this type of registration is the Organizationally Unique Identifier (OUI).</i></p>	<p>No.</p> <p>So far the project does not see the need for registration activity.</p>
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7.1	Are There Other Standards Or Projects With A Similar Scope? <i>Identify any standard(s) or project(s) of similar scope(s), both within or outside of the IEEE, and explain the need for an additional standard in this area.</i>	No.
7.2	Joint Development - Is It The Intent To Develop This Document Jointly With Another Organization? <i>If this document will be developed jointly with another organization, your IEEE-SA Staff Liaison must be made aware of this prior to final approval of the document by the IEEE-SA Standards Board (RevCom). If yes, please Indicate the organization, technical committee name/number and contact person within external organization</i>	No.

7.3.A	Adoptions- Is There Potential For This Standard To Be Adopted By Another Organization? <i>If this document is to be adopted by another organization, the document must be adopted Intact (whole and unmodified) and the requested contact persons entered on the submittal form. For Information about adoptions, contact your IEEE-SA Staff Liaison.</i>	Yes Standards bodies working on networking and transport such as IETF, ITU-T are likely to reference the requirements in their work.
7.3.B	Harmonization - Are You Aware Of Another Organization That May Be Interested In Portions Of This Document In Their Standardization Development Efforts? <i>If the document is to form the basis of or be included in an international standard, state the name of the organization, the number of the technical committee/ subcommittee (if applicable) and the information for the contact person from the other organization, along with any other pertinent information</i>	No Note: many other Standards Development Organizations (SDOs) such as ITU-T also show great interest in the NGFI topic. Although currently there are not dedicated working groups founded in those SDOs, yet this is simply because the NGFI is a very new topic and we believe once the IEEE NGFI working group has formed, they will get interest.

7.4	Does The Sponsor Foresee A Longer Term Need For Testing And/Or Certification Services To Assure Conformity To The Standard?	No
	Additionally, Is It Anticipated That Testing Methodologies Will Be Specified In The Standard To Assure Consistency In Evaluating Conformance To The Criteria Specified In The Standard?	No
8.1	Additional Explanatory Notes <i>For a PAR to modify a previously approved PAR, this field shall be used to describe what is being changed from the previous PAR. Any other information that will assist NesCom in the review of this PAR can be added here.</i>	<p>1, China Mobile, AT&T, Telecom Italia, SK telecom, Alcatel-Lucent, Broadcom and intel would like to be the co-founders of the WG</p> <p>2, Regarding the item 7.1, it is worth pointing out that ITU-T recently formed a Focus Group on IMT-2020 which working scope also includes the fronthaul topic, although their target is only to make the gap analysis instead of specifying standards.</p> <p>3, Regarding the item 7.3, it should be noted that many other Standards Development Organizations (SDOs) such as ITU-T also show great interest in the NGFI topic. Although currently there are not dedicated working groups founded in those SDOs, this is simply because the NGFI is a very new topic and we believe once the IEEE NGFI working group has</p>

THANK YOU!