Applicability of IEEE 802.3 projects to 5G

Prepared by IEEE 802.3 Working Group 5G Ad Hoc

Dear Mr. Parsons,

This letter provides the list of active IEEE 802.3 projects together with representative examples and their potential applications for 5G , intended as input to the IEEE EC 5G standing committee. There are two general classes of Ethernet physical layer specifications being added, namely point-to-point (P2P) and point-to-multipoint (P2MP), providing connectivity over different types of physical media, as outlined below.

- P2MP media, with two active projects, i.e., IEEE P802.3bn (http://www.ieee802.org/3/bn) EPON Protocol over Coax (EPoC) Task Force (TF) adding PHY specifications for symmetric and/or asymmetric operation of up to 10 Gb/s on P2MP Radio Frequency (RF) amplified or passive coaxial media; and IEEE P802.3ca (http://www.ieee802.org/3/ca) 25 Gb/s, 50 Gb/s, and 100 Gb/s Passive Optical Networks (EPON) TF adding PHY specifications for symmetric and/or asymmetric operation at 25 Gb/s, 50 Gb/s, and 100 Gb/s on P2MP passive optical networks (PON) with distance and split ratios consistent with 1G-EPON and 10G-EPON already defined in IEEE Std 802.3-2015.
- P2P media, with a number of active projects. IEEE P802.3bp (http://www.ieee802.org/3/bp) 1000BASE-T1 TF is adding PHY specifications for 1 Gb/s operation over single twisted pair copper cables. IEEE P802.3bz (http://www.ieee802.org/3/bz) 2.5G/5GBASE-T TF is adding PHY specifications for 2.5 Gb/s and 5 Gb/s operation over balanced twisted pair transmission media used in structured cabling. IEEE P802.3bv (http://www.ieee802.org/3/bv) Gigabit Ethernet Over Plastic Optical Fiber TF is adding PHY specifications for 1 Gb/s operation over standardized P2P plastic optical fiber. IEEE P802.3bq (http://www.ieee802.org/3/bq) 25G/40GBASE-T is adding PHY specifications for 25 Gb/s and 40 Gb/s operation over balanced twisted-pair copper cabling. IEEE P802.3bs (http://www.ieee802.org/3/bs) 400Gb/s Ethernet is adding PHY specifications for 400 Gb/s operation over a variety of physical P2P media.

All the aforementioned new PHYs are expected to be used to provide different types of connectivity between different types of 5G base stations (irrespective of their location) and carrier networks. For example, P802.3bn or P802.3ca PHYs are expected to be used in the first-mile connectivity, while P802.3bz is expected to be used to interconnect a 5G micro/pico station and transport equipment.

IEEE P802.3cb (http://www.ieee802.org/3/cb) 2.5 Gb/s and 5 Gb/s Operation over Backplane and Copper Cables TF is adding PHY specifications for 2.5 Gb/s and 5 Gb/s operation over backplanes and twinaxial copper cables. IEEE P802.3by (http://www.ieee802.org/3/by) 25 Gb/s Ethernet TF is adding PHY specifications for 25 Gb/s operation over a variety of media, including backplanes and twinaxial copper cables, as well as multi-mode fiber. These PHYs are examples of application of different Ethernet links within telecommunication equipment, which may be used to transport 5G data, thus further enabling broader market opportunity

There are also projects defining new mechanisms for delivery of power over varying number of twisted pair links, i.e., IEEE P802.3bt (http://www.ieee802.org/3/bt) DTE Power via MDI over 4-Pair TF adding power delivery mechanisms operating over 4 twisted pairs, while IEEE P802.3bu (http://www.ieee802.org/3/bu) 1-Pair Power over Data Lines (PoDL) TF is adding power delivery mechanisms operating over 1 twisted pair. Both projects have potential application in delivery of power to 5G base stations over already available twisted pair cabling.

IEEE P802.3br (http://www.ieee802.org/3/br) Interspersing Express Traffic TF is adding extensions to the existing Ethernet MAC to enable delivery of time sensitive information over various types of Ethernet links by suspending and/or fragmenting lower-priority traffic. This new Ethernet capability will likely find application for delivery of time-sensitive 5G control traffic to guarantee timely delivery over congested transport links.

Other efforts, currently in the Study Group Phase, may also be of interest, as these efforts, if progressed to Task Force stage, could provide other P2P PHYs of interest, varying in terms of rate, media, and reach. These efforts include 25 Gb/s operation over Single Mode Fiber (SMF) (see http://www.ieee802.org/3/25GSMF/index.html), 50 Gb/s Serial Ethernet PHYs (see http://www.ieee802.org/3/50G/index.html), and Next Generation 100GbE and 200GbE SMF PHYs (see http://www.ieee802.org/3/NGOATH/index.html). These three study groups have requested consideration of their PARs at the March 2016 meeting, and if approved by the IEEE-SA Standards Board, become official projects in the May 2016 timeframe.

The recently published IEEE Std 802.3-2015 provides a wide variety of different Ethernet PHYs covering different media types, different operating speeds, etc. providing Ethernet-based solutions for application in various elements of 5G transport. The native support for time stamping, added under P802.3bf (http://www.ieee802.org/3/bf) project (now part of IEEE Std 802.3-2015) enables precise distribution of time synchronization information over Ethernet links.

Sincerely,

David Law

Chair, IEEE 802.3 Ethernet Working Group