Project: IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)

Submission Title: [Prospect of next ten years R&D on terahertz communication]
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Abstract: [This document discusses the R&Ds on terahertz communication in the next ten years.]

Purpose: [Information]

R&D on THz Comm. in NEXT 10 years

Aiming for ultra-high bit-rate (e.g. 1Tbit/s)
→ Use higher frequency bands (e.g. THz)
→ Smaller coverage (e.g. 10 m)

Basic Questions:

Coverage vs. Economical Efficiency

Private 5G(/B5G/6G) vs. Wi-Fi X

(Natural) Extension of 3d

[R&D in Last 10 Years] (IEEE802.15.3d)

Beam Switchable Point to Point Link with 100Gbit/s

Technologies to be developed

Beam Steerable Point to Multi-Point Link over 1Tbit/s

[R&D in Next 10 Years for IEEE802.XX.XX]

(Natural) Extension of 3d

[R&D in Last 10 Years] (IEEE802.15.3d)

Beam Switchable Point to Point Link with 100Gbit/s

Array Antenna

Technologies to be developed

Beam Steerable Point to Multi-Point Link over 1Tbit/s

[R&D in Next 10 Years for IEEE802.XX.XX]

(Natural) Extension of 3d

[R&D in Last 10 Years] (IEEE802.15.3d)

Beam Switchable Point to Point Link with 100Gbit/s

Array Antenna

or/and

100 mW class-PA for 10 m

Beam Steerable Point to Multi-Point Link over 1Tbit/s

[R&D in Next 10 Years for IEEE802.XX.XX]

(Natural) Extension of 3d

[R&D in Last 10 Years] (IEEE802.15.3d)

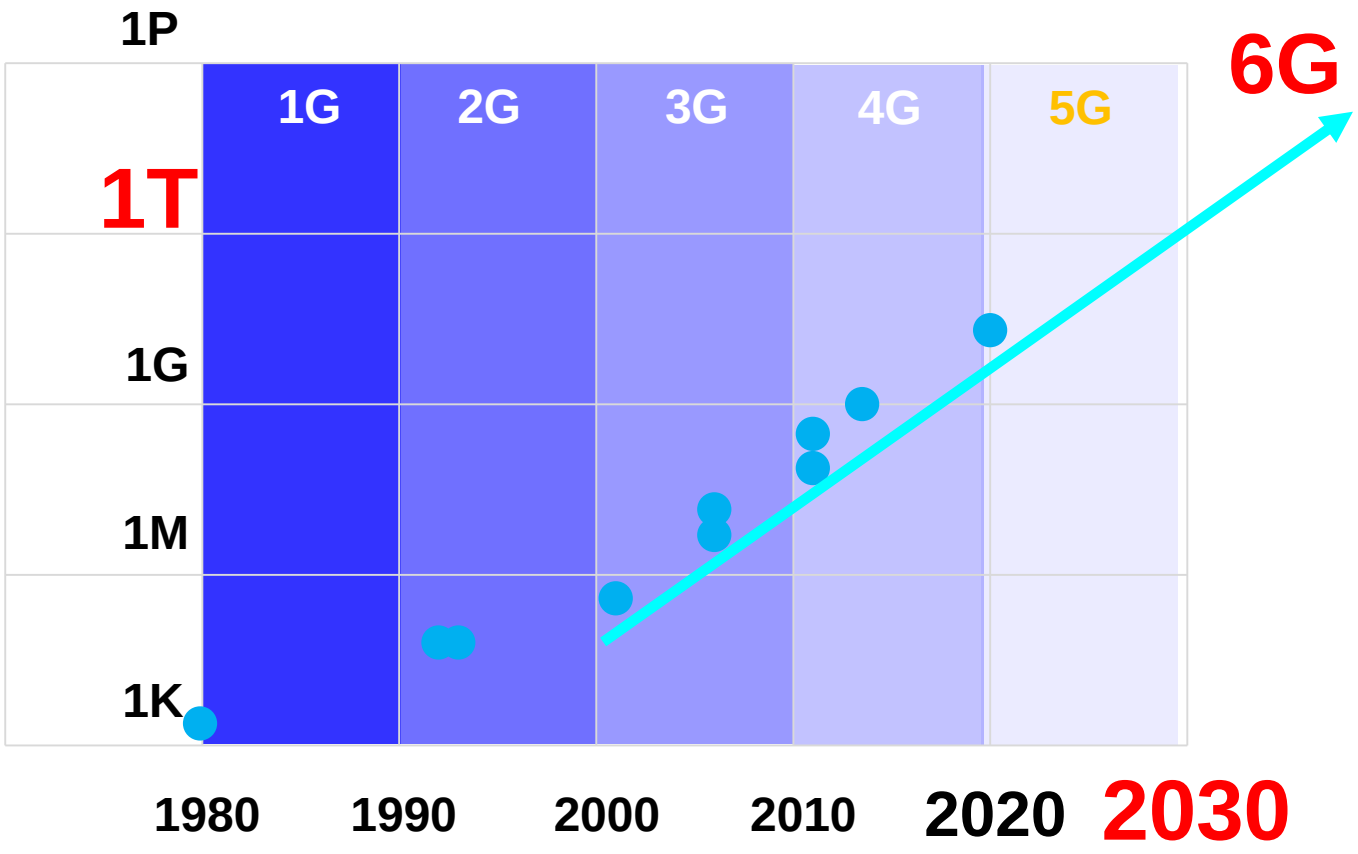
Beam Switchable Point to Point Link with 100Gbit/s

Massive MIMO
with
Array Antenna

Beam Steerable Point to Multi-Point Link over 1Tbit/s

[R&D in Next 10 Years for IEEE802.XX.XX]

Trend of mobile system



Challenges-1

[R&D in Last 10 Years] (IEEE802.15.3d)

Beam Switchable **Point to Point Link** **with 100Gbit/s**

Array Antenna

Technologies to be developed

Beam Steerable **Point to Multi-Point Link** **over 1Tbit/s**

[R&D in Next 10 Years for IEEE802.XX.XX]

Challenges-2

[R&D in Last 10 Years] (IEEE802.15.3d)

Beam Switchable Point to Point Link with 100Gbit/s

How to find Tx/Rx pair

Technologies to be developed

Beam Steerable Point to Multi-Point Link over 1Tbit/s

[R&D in Next 10 Years for IEEE802.XX.XX]

Challenges-3

[R&D in Last 10 Years] (IEEE802.15.3d)

Beam Switchable **Point to Point Link** **with 100Gbit/s**

Interference among THz systems with very narrow beam

Beam Steerable **Point to Multi-Point Link** **over 1Tbit/s**

[R&D in Next 10 Years for IEEE802.XX.XX]

Challenges-4

[R&D in Last 10 Years] (IEEE802.15.3d)

Beam Switchable | Point to Point Link | **with 100Gbit/s**

Signal processing for 1 Tbit/s (Massive MIMO, FEC, BB, etc)

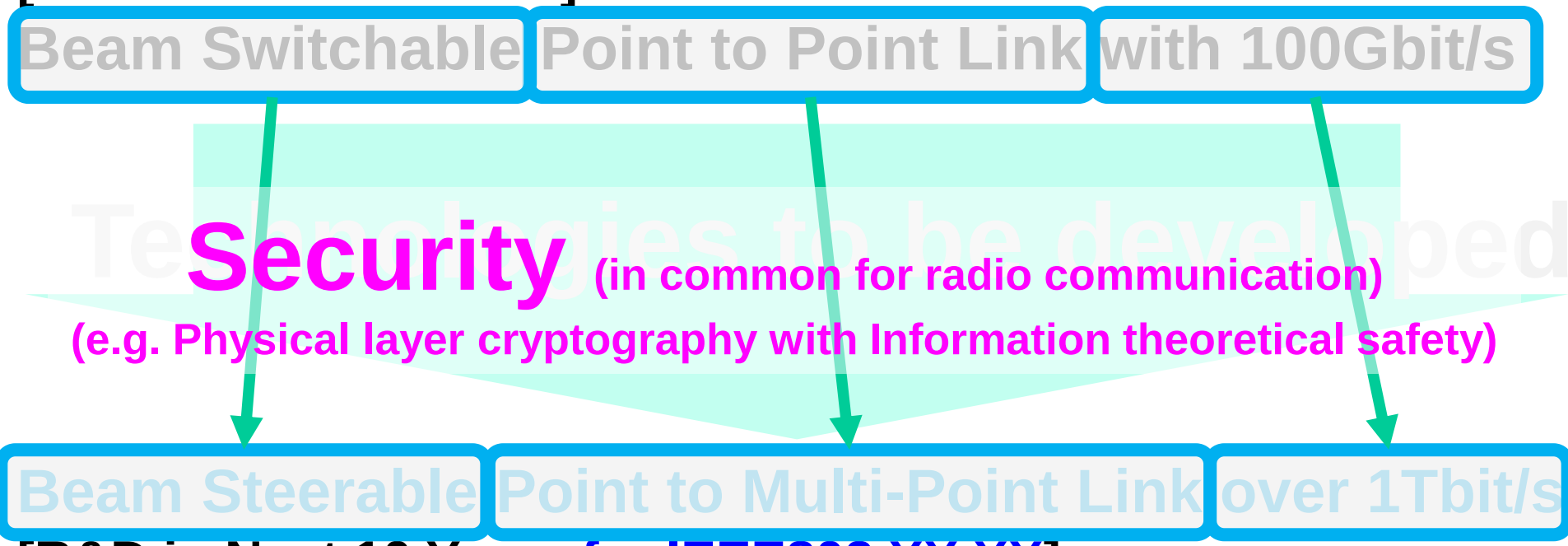
Technologies to be developed

Beam Steerable | Point to Multi-Point Link | **over 1Tbit/s**

[R&D in Next 10 Years for IEEE802.XX.XX]

(Challenges-5)

[R&D in Last 10 Years] (IEEE802.15.3d)



[R&D in Next 10 Years for IEEE802.XX.XX]

R&D in NEXT 10 years (Summary)

Aiming for ultra-high bit-rate (e.g. 1Tbit/s)
→ Use higher frequency bands (e.g. THz)
→ Smaller coverage (e.g. 10 m)

Technologies to be developed:

1. **Array antenna**
2. **Algorism to find Tx/Rx pair**
3. **Avoiding interference among THz systems**
4. **Advanced signal processing**
5. **(Assured security)**