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Beyond 10km reach objective discussion

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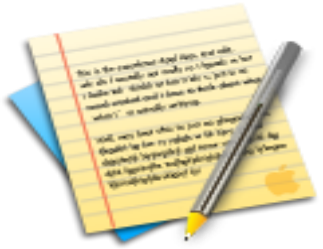
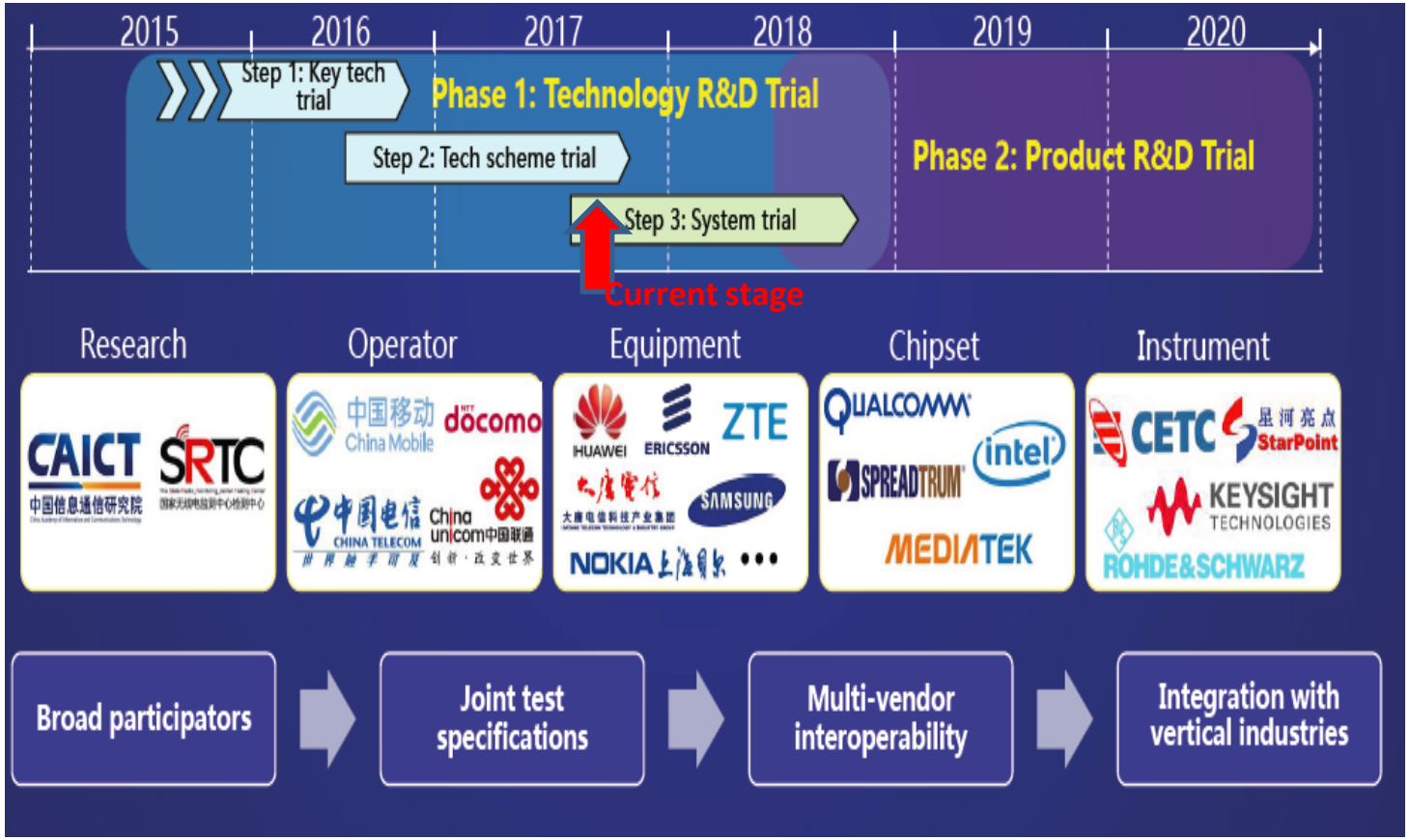


Outline

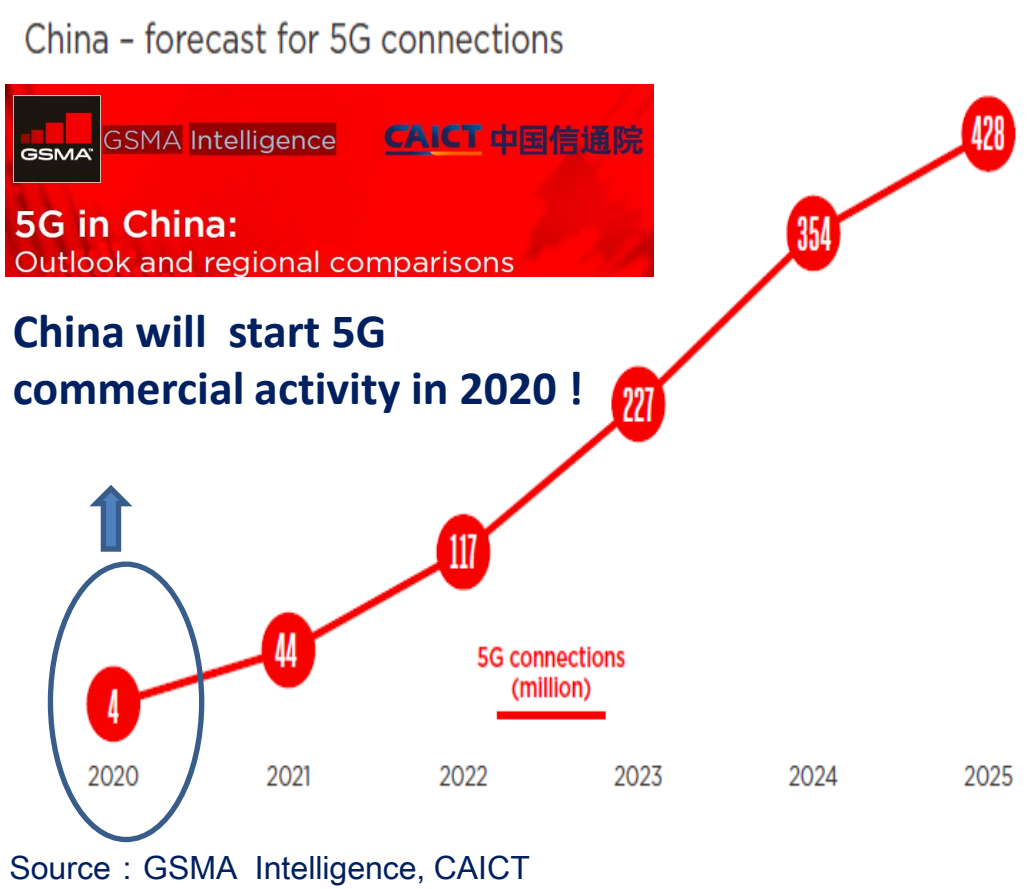
- 5G R&D status in China
- Beyond 10 km reach objective discussion
- Summary

5G become one of ICT R&D focuses in China

IMT2020(5G) Promotion Group of China was founded in 2013, and focused on promoting the R&D of 5G key technologies, technical solutions, and global unified standards, accelerating the development of 5G products, and building 5G ecosystem.



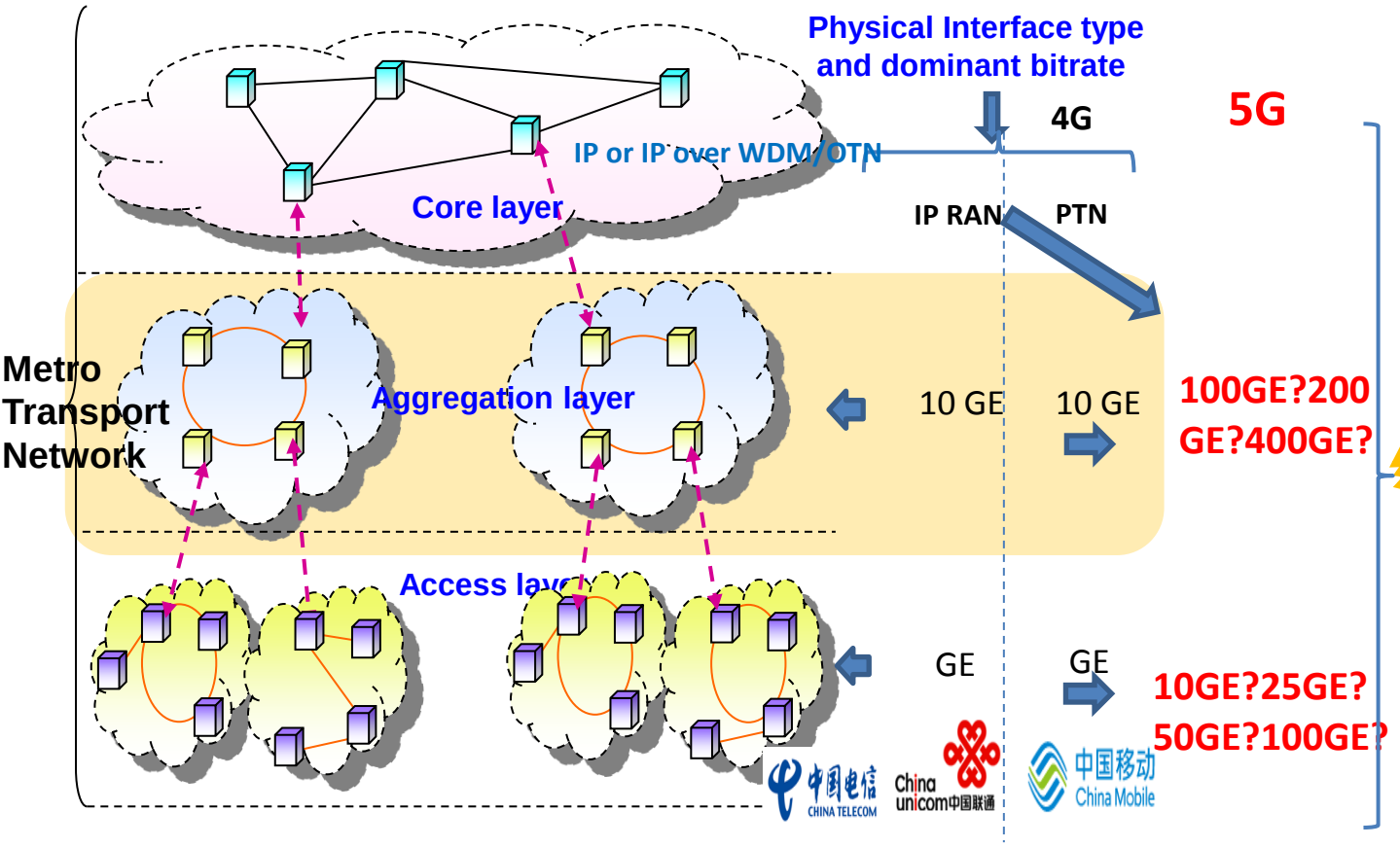
Source: http://www.imt-2020.org.cn/zh/documents/1



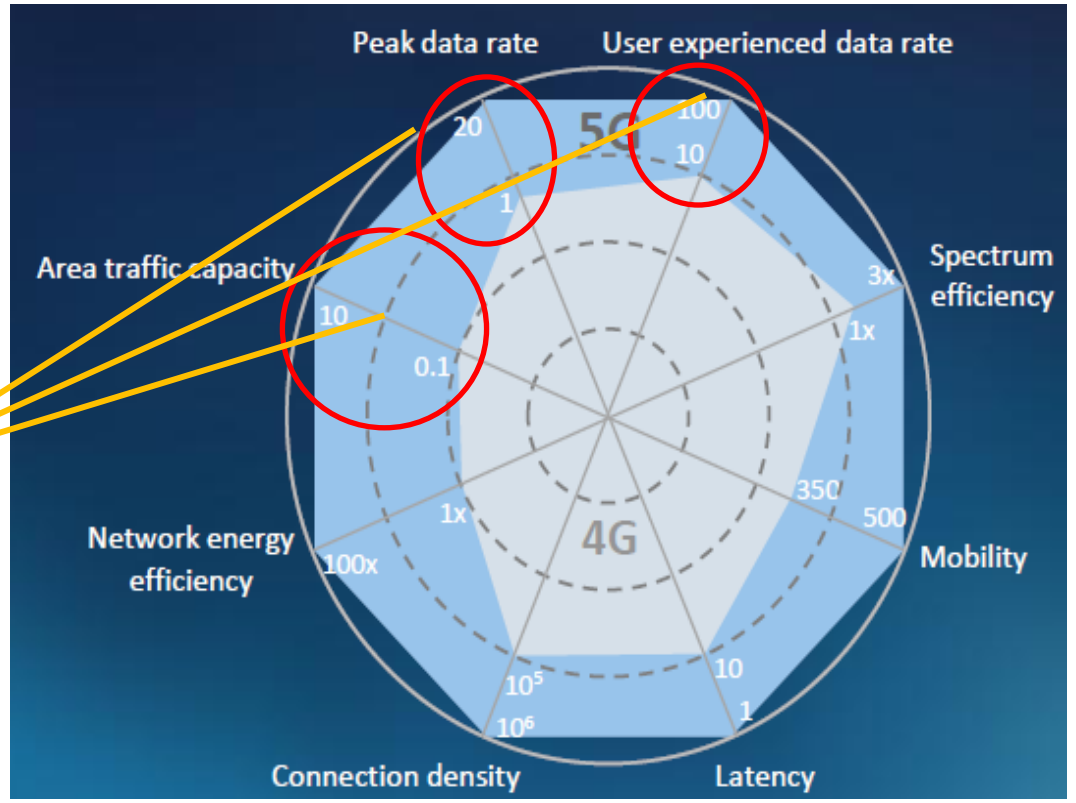
Source：GSMA Intelligence, CAICT

5G backhaul drives high bitrate application

Typically ,metro transport network is divided into three sublayers in China operators, i.e., core layer, aggregation layer and access layer ,and the last two layers are mainly used to provide transport function by different technology (IP RAN and PTN) for mobile back-haul.



5G vs. 4G typical requirements



Source: http://www.imt-2020.org.cn/zh/documents/1

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Node distance and module used from actual networks

Each metro network may have its own distribution characteristic of distance, and some node distance from actual networks and transceiver module type used in China are investigated.

Some metro aggregation layer reach distribution

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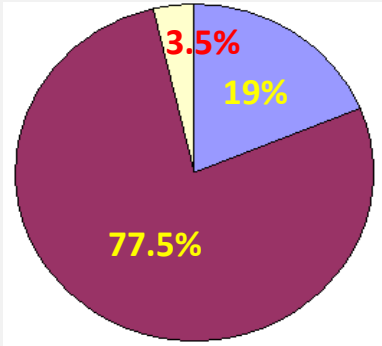
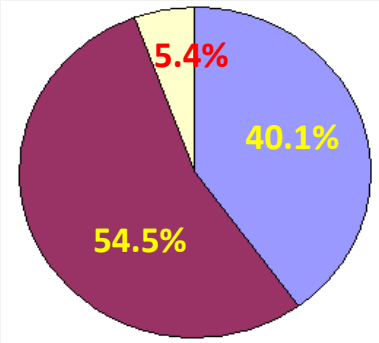
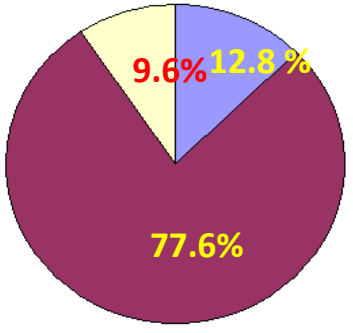


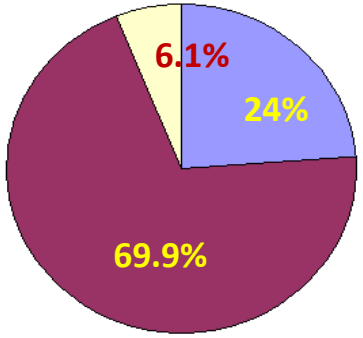
Province A some metro aggregation layer reach distribution



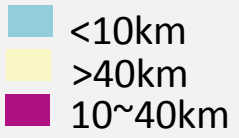
Province B some metro aggregation layer reach distribution



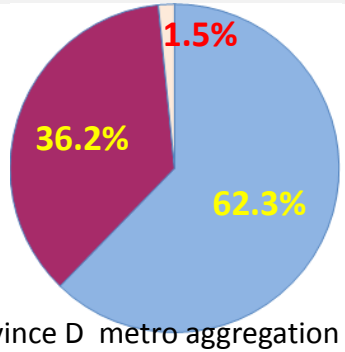
Province C some metro aggregation layer reach distribution



Some metro aggregation layer reach distribution (ave.)

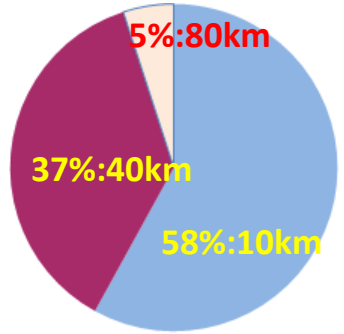


Metro aggregation and access layer reach distribution

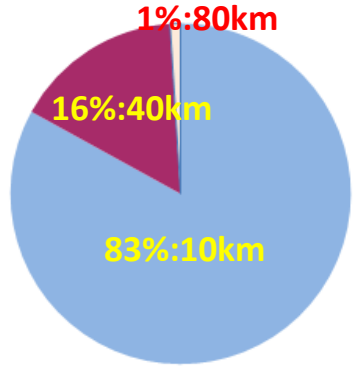


Province D metro aggregation and access layer reach distribution

Carrier A national transceiver module type distribution used in aggregation and access layer



10GE module



GE module

From the investigation results related to the aggregation /access node distance, and transceiver module type used in actual networks in China, beyond 10km reach objective of high bitrate(50GE/200GE/400GE) is suggested to be 40km, or to be 30 km and engineered link up to 40 km like 100GBASE-ER4 (p802.3ba)and 25GBASE-ER(p802.3cc)!

Some technical scheme considerations for beyond 10km

- Current typical technical scheme(i.e., 50Gb/s PAM4 per lambda) of high bitrate Ethernet interface face serious technical feasibility challenge if the beyond 10km reach objective is extended to 40km.
- Except for 50Gb/s PAM4 per lambda scheme, some modulation/multiplexing and detective technology can be introduced as new candidates to support beyond 10km transmission, i.e., DMT based DSP, coherent detection based on DSP,etc.
- Detailed research and experiments analysis from different companies should be provided to help choose the low cost and feasible technical scheme for the 40km application of 50GE,200GE and 400GE.

Summary

1. 5G become one of ICT R&D focuses in China, and 5G commercial activity will start in 2020 .
2. 5G backhaul drives high bitrate application, and beyond 10G Ethernet bitrate would be deployed in aggregation and access layer.
3. Some node distance and optical module types from actual networks are investigated. Up to 36% of node distance is between 10 and 40km, and 37% of 10GE optical modules used in the field is 40km in the investigated metro aggregation and access layer .
4. Beyond 10km target reach is suggested to be 40km or 30 km and engineered link up to 40 km if considering 5G transport application scenarios, and new technical scheme should be introduced to help choose the optimum scheme for beyond 10km application.

THANK YOU

FOR YOUR ATTENTION!