

Panel 2: Moonshot mmW Challenges and Opportunities for 2020, 2025, 2030

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Overview: Almost exactly 10 years ago to this date (June 29, 2007) was the first release of the iPhone. This product drove a decade of tremendous growth in mobile wireless connectivity and traffic. The success of mobile technology in the last decade is also driving the connectivity, data, and latency challenges for 5G and beyond. mmW wireless technology is poised to tackle some of these challenges. The broad goal of this panel is to outline a vision that will drive mmW wireless research and technology for the next 5-10 years. What are some “moonshot challenges” that we can address and find a solution for in the next 5 years, 10 years? What is our vision for how mmW wireless will be used (within the broader wireless landscape)? What are the technical requirements and challenges? What are the business challenges? Or, is there no need for revolutionary technologies? Is the future growth more incremental?

The goal is to identify mmW moonshot challenges and opportunities that will galvanize industry and academic researchers to closely work together for concrete and transformative deliverables in the next 5-10 years.

Three broad topics of discussion are suggested to generate concrete ideas for discussion:

1. What are some “moonshot use cases” for driving mmW research and technology?
2. What are some “moonshot technology requirements” for driving mmW research?
3. How can academia and industry collaborate to leverage the new NSF PAWR (Platforms for Advanced Wireless Research) program to deliver “moonshot” advances?

Format: Sundeep will begin with quick introductory comments for a few minutes. Then Sundeep will introduce each of you and ask you to give a very short (<3 minute intro and statement). Then, Sundeep will go into questions, with audience having opportunity to speak.

Discussion Questions

- What use cases will drive the next generation of mmW wireless technology and network expansion? Can you think of any application / use cases that right now would look remarkable – like a “moonshot”.
- Possible use cases include:
 - Further increase of common wireless applications we use today such as video, web browsing,
 - Connected car: autonomous driving, media download, sensor data fusion.
 - VR / AR

- Robotics
- Telepresence
- Cloud / edge computing
- Others?
- In the context of cloud computing, there is always a choice between local and remote computing. While wireless connectivity will improve, so will the computational processing and storage capabilities of devices. Which trend will dominate?
- Can we imagine the use cases now? Is that the way we should drive research? Can we trust that if we provide data, it will be used?
- What are the devices of the future? What will be connected?
 - Smartphones
 - Wearables
 - Machines, robots?
- Let's be more bold. Wireless is about connectivity of devices and people. Imagine yourself as a science fiction writer. If technology was not an issue, how would people interface with devices, the cloud, and other people?
- What are the technical requirements for these applications:
 - Latency
 - Data rate
 - Numbers of devices
 - Power consumption
- Can we think of specific technical goals to strive for (e.g. capacity of x Gbps, y latency, ...)?
- What are the technological areas that we need to concentrate on? What are the real bottlenecks in achieving this vision:
 - New user interfaces?
 - Power consumption?
 - Air interface
 - Network density / infrastructure.
- Which of these are simply business rather than engineering challenges.
- What skills / expertise will be needed for developing the future wireless technology? How should we be training students?
- What companies have the right assets / expertise to succeed. Will new players (e.g. Google, Facebook, cable providers) play a growing role?
- Will wireless become like a utility?

Some data for your thoughts:

<http://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/mobile-white-paper-c11-520862.html>