



IEEE

# The World Moves Toward 5G

**Having affordable broadband service these days is as important as accessing any other utility. It is a cornerstone of 21st Century life.**

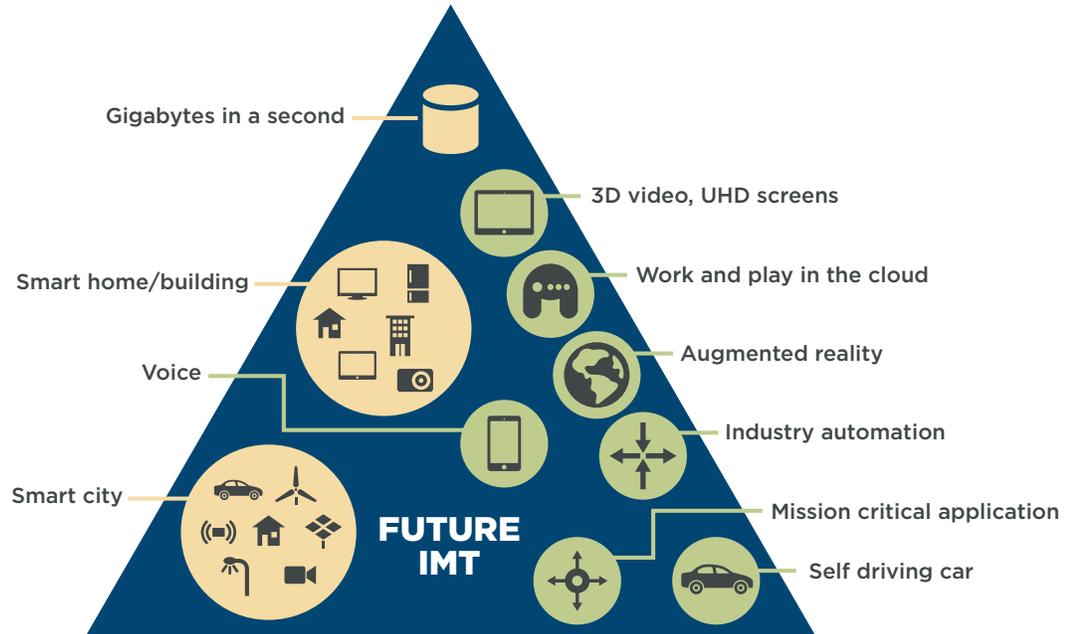
And, universal wireless broadband service is the ultimate. That translates to having 5G access.

Broadly speaking, 5G is the 5th generation wireless broadband and has three key values: (1) very high speed, like 1 gigabit per second; (2) ultra-reliable, very low latency possibly in the range of single digit milliseconds (for clarity's sake, 1 ms. is about the duration of a strobe light flash); (3) massive machine type communications for connecting sensor based device. Taken as a whole, this means speeds of 100 times faster than what is achievable today via wireless, at 100 times less delay, leading to the likely ubiquitous deployment of the Internet of Things (IoT). See an illustration of the usage scenarios for 5G in the below figure which is taken from the 2015 ITU Recommendation M.2083 "IMT-Vision - Framework and overall objectives of the future development of IMT for 2020 and beyond"



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## ENHANCED MOBILE BROADBAND



### MASSIVE MACHINE TYPE COMMUNICATIONS

### ULTRA-RELIABLE AND LOW LATENCY COMMUNICATIONS

But it won't be easy.

5G is expected to be based on a broad array of existing and future standards from the IEEE, IETF, 3GPP and other standards development organizations. Some carriers have scheduled it for launch in 2020, but some see it delayed beyond that. The earliest pre-standard deployments will likely be at the PyeongChang 2018 Winter Olympics to be held in South Korea.

**Communications companies** from around the globe are working on 5G, many attending IEEE, 3GPP, IETF and ITU meetings and then developing pre-standard 5G in their private laboratories.

One such entity is Verizon. It recently hosted Goldman Sachs analysts at its HQ in New Jersey. A GS note indicated that part of the meeting involved a demonstration using one 800 MHz channel in the 28GHz spectrum supplied to an "apartment" of four ultra-high definition TVs, a WiFi router and three virtual reality headsets. The analyst note indicates that the widest channel Verizon currently uses in its LTE network is 20 MHz, 40 times more narrow than what was used in the demonstration.

Some issues that arise with using very high frequency millimeter spectrum such as 28 GHz even in controlled lab demonstrations are that signals may be absorbed by the atmosphere, trees and walls.

