HCL 5G PODCAST SHOW

EPISODE 1: "5G: New Era of Global Revolution"

TOPIC 1: INTRODUCTION	
1.1	**Ashima-** Hello Everyone, Welcome to HCL 5G Podcast Show. I am Ashima Garg, your host for the show and a part of 5G Marketing Strategy Team at HCL. This podcast is on 5G, which is the New Era of Global Revolution. In this episode we will be discussing how 5G ushers us to a new era of connectivity, with greater network reliability, ultra-low latency use cases and millions of connected devices in its ecosystem. And for this discussion, we have with us Emil Bjornson, who is an expert with more than 25 years of experience in wireless Communications. He has been recognized with numerous awards, has authored three textbooks and received more than 14000+ citations. Now Let's hear from Emil himself and understand his point of views on 5G and its future.
1.2	**Ashima-** Hi Emil, Thanks for joining us for the HCL 5G Podcast Show. I would like you to introduce yourself to our audience here. **Emil:** Hi Ashima, Thanks for inviting me for this. Hello Everyone, This is Emil Bjornson, a Professor at KTH and Linköping University. I have been Working with signal processing and communications related to multi-antenna technology for 15 years. I am Proponent of "Massive MIMO" technology in the 5G era with theory and educational effort and have Helped bring it from science fiction to key 5G technology
1.3	**Ashima-** Thanks Emil for the introduction. Why did you choose Wireless communication industry, what attracted you to it? **Emil-** I would say Coincidence: I was Interested in signal processing during undergraduate studies, happened to do a PhD in a group work with communications. Chose to stay on when wireless becomes a cornerstone of our society.
1.4	**Ashima-** Interesting! Emil, there is lot of buzz in the market that 5G will unlock a world of opportunity? Is it just a buzzword or it plans to show us a new world? What is your current position related to this? **Emil-** Roy Amara said "We tend to overestimate the effect of a technology in the short run and underestimate the effect in the long run." The 5G hype overestimates how quickly things will change, such as 1000x times more data over 10 years (instead of 50x which is more realistic). In practice: A gradual evolution that becomes a revolution when looking back. 5G is a platform to enable digitalization and integration over all devices in one network. But not a one-size-fit-all as in 4G but a one-network-supporting-different-services. The mobile broadband component is already here, it works in 5G. Fixed mobile broadband also exists at some markets. mmWave bands, ultra-reliability low-latency communications, internet-of-things remain to demonstrate if they live up to the expectations. Very early so far, but in 5 years, the majority of cellular traffic goes through 5G.

TOPIC 2: DEFINITION OF 5G	
2.1	**Ashima-** If you see transition of communication Industry from Voice, to SMS to data access to video calls and now a new era of the way Enterprise operates. How do you think this entire journey from 1G to 5G have changed us? **Emil-** I resisted getting a mobile phone until the 3G era, since I liked to be unconnected. Now I'm fully connected all the time. Video calls were introduced in 3G, but excelled 10 years later, social media has taken over conventional media, location-based services have changed how travel, etc. Our lives are gradually changing to become increasingly reliant on connectivity. Pandemic has shown us that we can now to a large extend live connected, without meeting physically. This will change how enterprises carry out their business. Online customers, employees working from home. Virtual and physical worlds become closely connected.
2.2	**Ashima-** Yes, indeed a lot has changed. What do you think are the new technology advancements in 5G that will enable us to see a new world? **Emil-** Multiplexing of devices is key. The 5G components: More bandwidth for short range applications + massive MIMO for long range applications. High data rates can be traded away for lower latency, higher reliability, lower energy consumption, etc. Called network slicing – one network reconfiguring itself for different services. Other things: Transition from hardware-centric to software-centric radio access networks, more efficient core networks needed, edge cloud processing become key New chipsets to handsets that support new bands, MIMO in the phone, etc., has pushed the limits of what we thought could go into consumer products.
2.3	**Ashima-** With 5G bringing so many advantages, I also see the complexity that gets introduced in the Telco network. What are some of the key 5G challenges that you see 5G introduces in the Telco network? **Emil-** Basic 5G can be fairly easy to deploy: Upgrade software in existing sites, replace passive antennas with active antennas. However: Lower latency requires a new core network, since most delays are in the network Fronthaul/backhaul capacity limitations appear when traffic grows, requires fiber to sites. Switch from decentralized to centralized network architectures.

	mmWave bands: New deployment philosophies, more in competition with WiFi than before. Massive MIMO creates a new way of thinking in terms of network dimensioning. One cell doesn't have a fixed capacity, but spatial multiplexing gives more capacity when new users are available, not otherwise.
TOPIC 3: USE CASES	
3.1	**Ashima-** 5G brings new era for Enterprises as it has the capability of connecting millions and millions of devices. It is supposed to change the way Enterprise operate. What are the major industries which will take the advantages of 5G? **Emil-** Enterprises are very interested to participate in research projects related to these use cases. Now when 5G products are here, the work on testing and integration can really start. 5G for enterprises enables: Smart factories (automation, reliability, latency), smart mines (better control, safety of personnel), connected vehicles, smart office, health care. Creates new possibilities for remote control, automation, machine-to-machine, data collection and prediction, higher security and flexibility. All devices can be connected, analyzed, optimized. Resource efficiency, enabled by machine learning. Many potential use cases, remains to see in which cases 5G replaces existing technologies (cables, WiFi,…).
3.2	**Ashima-** Though 5G opens door for umpteen use cases, but autonomous vehicle is the one use case which everyone is looking forward. How do you see this use case shaping up? **Emil-** Autonomous vehicles are exciting. It remains to see if/when such vehicles become as safe as human drivers. I'm ambivalent to the role of 5G here. The core intelligence must exist in the car since wireless will always be susceptible to attacks. Wireless will rather be an add-on to enable trustful coordination, but must also work when the connection breaks. Maybe enabling higher speeds when it is available or shorter distances between vehicles. Tests are being carried out. The limiting factor is still in the AI part of autonomous vehicles.
3.3	**Ashima-** 5G opens new gates for Enterprises, how do you think 5G Private Networks will help Enterprises. **Emil-** Enterprises need to determine when WiFi and other existing services are sufficient, and when 5G should be used instead.

	Benefit with 5G private networks: Quality of service can be guaranteed, since licensed spectrum instead of unlicensed. Enables a more efficient and predictable radio interface. Benefits: Rates, availability, reliability, security, latency.
TOPIC 4: 5G MARKET	
4.1	**Ashima-** 5G has given rise to many alliance and consortiums like ORAN Alliance, SONIC, 5G alliance for connected Industry and automation. What is your take on this, how will this alliance help the members? **Emil-** ORAN and SONIC have been very effective in pushing Open RAN, which is now here for real. This will shake up how 5G networks can be deployed, using a mix of hardware from different companies instead of having only one or two vendors. 5G Alliance: Shows the importance of utilizing 5G in the industry, and the keen interest to find the best way of utilizing it.
4.2	**Ashima-** I have seen lot of collaborations and partnerships between different vertical segment to make the max of 5G. Do you think collaboration between different industry players will help in 5G monetization? **Emil-** 5G is supposed to be platform to enable new services. “Everyone” has mobile subscriptions, so the new revenue streams in that area might be limited, but digitalization can create new markets that didn’t exist before. We have already seen how internet has changed news media, delivery of music and videos, bank services,... What comes next? Verticals want to be first with embracing the new technology, while network operators want to find new customers to make money. It is a perfect match since previous attempts from network operators to create services on their own have often failed.
4.3	**Ashima-** 5G has given rise to many new players in market whether in chip side of the house or OEM side of the house. Do you think new players will be able to make their mark in 5G Market? **Emil-** Yes, Open-RAN is opening up the door for network infrastructure vendors. You don’t need to have a full catalog of products. For example, the use of edge-computing is making Amazon and other cloud service providers very interested in getting involved.
TOPIC 5: FUTURE OF 5G, EVOLUTION TOWARDS 6G	
5.1	**Ashima**- 5G is considered as Industrial Revolution**.** How will 5G lead to evolution of 6G and by when do you see 6G capturing the market **Emil-** Release 15 in 3GPP was called 5G (2017-2018). In the same way, a release appearing around 2028 will be called 6G, whatever is ready at that time. It is more of a branding name than a strict starting point of a new technology.

	New technology aspects will provide massive spatial multiplexing, reconfigurability of propagation environment, cell-free networking for interference mitigation. More bandwidth in higher bands will likely be a part of 6G as well, but I'm less convinced that it will be a key component.
5.2	**Ashima-** What kind of new use cases will be there in 6G? What industries will get affected **Emil-** The "boring" answer is that it will be Mobile broadband, version 4 Massive IoT, version 3 Ultra-reliable low-latency, version 2 New services that might not fit into those categories: Augmented/virtual reality – main consumer use case? Internet-of-senses Limitless connectivity – as reliable and accessible as electricity All industries will eventually make use of wireless connectivity, either in 5G or beyond.
5.3	**Ashima - Conclusion –** 5G is definitely an industry revolution and will play a key role in revolutionizing the society. We at HCL understand the importance of being an early investor in 5G. We are making lot of investments in Solutions, accelerators, labs and working very closely to accelerate our customers 5G journey. It was our pleasure to have you Emil in our first 5G Podcast show. Thank you so much for this enriching session. I have got so much insights on 5G and I am sure others will also learn from this. Stay tuned for our next 5G track.