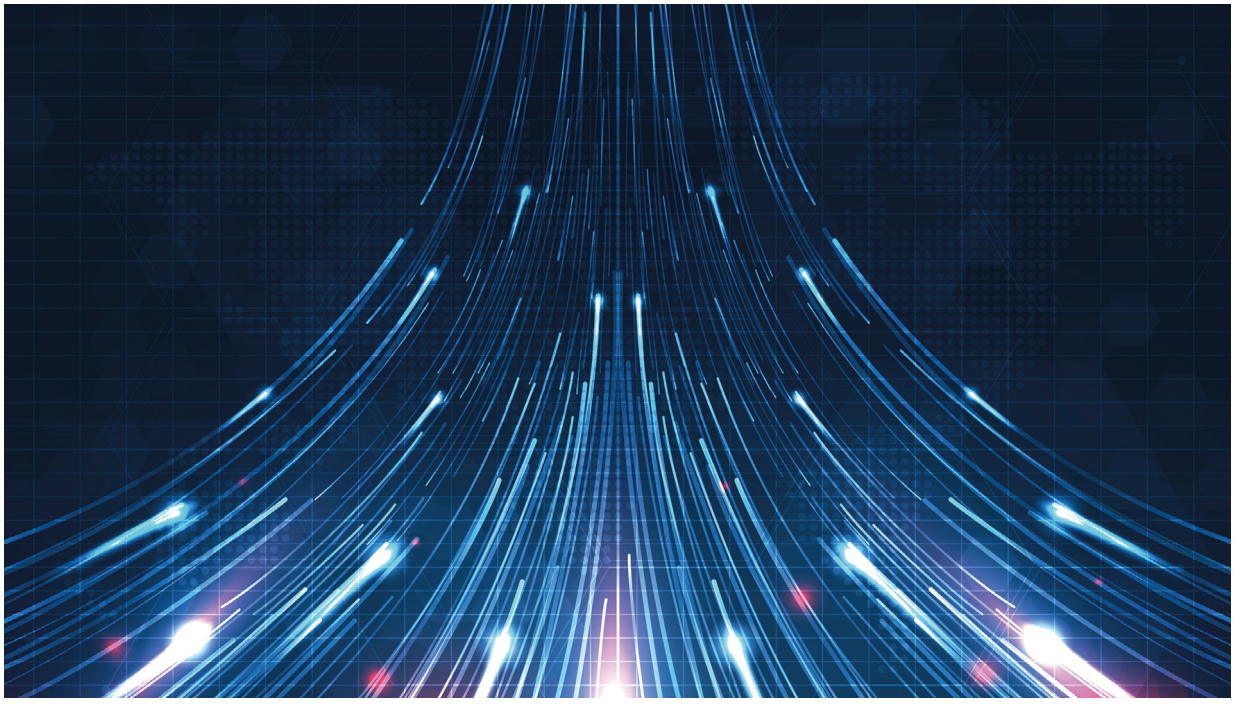
Is It Too Soon to Prepare For 6G Connectivity in Electronics Manufacturing?

Move over, 5G. There is a new network connectivity on the block…
by **Phil Simmonds, CEO of EC Electronics.**



Although 6G is still in its infancy, its development promises to usher in unparalleled speed, capacity and connectivity advancements.

Imagine having access to lightning-fast internet speeds of up to 1 terabit per second (TBPS), far surpassing the 20 gigabytes per second (GBPS) offered by 5G. With 6G technology, consumers can expect to experience faster data transfer and streaming, leading to more efficient and effective communication between devices.

Additionally, 6G will support many connected devices, perfect for the rapid development of internet of things (IoT).

The possibilities are endless, but we have a long way to go before 6G becomes a reality. So, how can electronics manufacturers prepare for what lies ahead?

Rethinking networks

Though it is hard to predict what 6G will look like, we can expect new and innovative possibilities – including holographic communications, intelligent network operations and computing convergence.

As tomorrow's ground-breaking applications (like the metaverse and augmented reality) will require increased connectivity, the utilisation of edge and cloud infrastructure will play a massive role in deploying 6G networks.

The benefits that 5G already offers will also be delivered by 6G, with much higher performance. Beyond that, 6G will enable intelligent, hyperconnected, decentralised and highly secure networks with exceptionally high capacity and coverage. This means that 6G networks will have access to more advanced artificial intelligence (AI) capabilities and enhanced support for sophisticated mobile devices than 5G.

Evolving PCB design

6G's emergence will significantly impact printed circuit board (PCB) design.

With 6G technology expected to operate at frequencies of 100 GHz and above, PCB manufacturers may need to invest in new tools to create increasingly complex elements and structures suitable for these high rates.

PCB engineers may also need to seek new materials with multilayer capacities that can withstand these high radio frequencies without overheating or hindering performance. Additionally, many PCB designs for 6G-enabled IoT electronics and other devices must include millimetre-wave (mmWave) circuits.

Boosting IoT capabilities

The rollout of 6G will take the IoT to new heights and deliver the bandwidth needed to supercharge the metaverse: the virtual reality network of connected 3D visual worlds. From virtual meeting spaces to 3D-rendered social media pages, the possibilities are endless.

We can expect an influx of new 6G-enabled smart devices, too. With seamless connectivity, businesses can harness data on an unprecedented scale to transform

processes across a range of industries, including electronics manufacturing.

For example, IoT sensors can monitor machinery performance in real-time, predicting possible breakdowns or errors. For manufacturers, this can prevent costly downtime and increase overall equipment effectiveness.

Plus, if an accident occurs, all staff can be alerted, operations can cease and the incident can be resolved. With collected data, IoT technology can also help prevent a repeat occurrence in the future.

Some manufacturers are also starting to introduce wearable IoT devices among their teams. Wearables can monitor work conditions and alert employees to any missed safety procedures, allowing them to correct their actions and stay protected on the job.

Prioritising cyber security

Launching 6G has the potential to exponentially increase the volume of data transmitted over networks, thereby expanding the attack surface for potential cyber threats. As such, all 6G participants – from electronics manufacturers to mobile operators and suppliers – must implement new security, testing and training standards…

Firstly, enhancing user awareness and education is a critical defence mechanism against cyber threats. Manufacturers must foster a culture of cyber security awareness, where workers are equipped with the knowledge to identify potential threats and empowered with best practices for safeguarding their data and devices.

Electronic product designers must also implement cyber security into their devices' software design and development lifecycle – with integrated protections that identify vulnerabilities and help to quickly recover networks in the event of a data breach.

Plus, electronics manufacturers can utilise AI-driven algorithms for real-time threat detection and response. These systems can constantly learn and adapt to new threats, ensuring the network's resilience against evolving cyber-attacks.

Empowering the next generation

To make 6G a reality in the manufacturing industry, a new generation of researchers, product designers and manufacturers must be upskilled.

From training programs and courses to workshops, there are resources electronics manufacturing companies can invest in to equip their staff with the knowledge and skills required to work with 6G technology effectively.

Although no workforce is expected to become experts in the 6G field, understanding 6G network infrastructure, IoT integration, data security and other relevant areas will create a safer, more productive work environment.

There is no doubt: the next generation of wireless communications technology is on its way. So, to ensure we are ready with the right capabilities and infrastructure by 2030, electronics manufacturers must start working now to realise the 6G devices of the future.