ANNEX H: Factsheet on NYP APEX5G @Sentosa

Background

APEX5G @ Sentosa is NYP and GovTech's latest collaboration.

Key objectives of APEX5G @ Sentosa include:

- Being a testbed for Government Agency trials
- Develop, test, and demonstrate 5G use cases with the industry, public organisations, and other government agencies
- Engage new industry and agency partners to drive 5G adoption in Singapore in collaboration with GovTech
- Conduct 5G training to upskill the workforces in 5G and allied technologies
- Support NYP learners and industry partners for R&D
- Organise visits for NYP's PET and CET students and staff to learn more about 5G technology

APEX5G @ Sentosa is located at the Ranger Station Building. The team will be showcasing a series of new use case applications, including:

Use Case Application	Project Info	Additional assets
5G-Enabled Digital Solutions for Healthcare with cloud- based Mixed Reality (MR) capability	The 5G-Enabled Digital Solutions for Healthcare with cloud- based MR capability will improve data-intensive production and supply chain simulations in manufacturing and AR-assisted hospital surgeries. In the operating theatre, surgeons use technology like augmented reality to improve their surgery procedures. Likewise, high-tech industries often require simulations, as this allows the workers to visualise multiple "what-if" operational scenarios before they are implemented to reduce risk. But such simulations in the market are currently run using 4G and Wi-Fi connectivity, both of which are confined to on-premise PCs and incur significant costs due to the voluminous data and computing requirements.	

	With high-speed and high bandwidth 5G connectivity, simulations will become richer and more accessible as 5G is able to support more data flow over the cloud, without needing it to be stored in PC screens. Smart glasses, like the Microsoft HoloLens, is one such tool. NYP is co-developing with National University Hospital (NUH) to 5G-enable the rendering and streaming of medical images through the HoloLens. NUH surgeons wearing the glasses will be able to visualise the scanned image, superimposed over the patient in 3D in real-time, to see the inner organ/tissue/bone details while performing an operation.	Graphic for 5G-Enabled Realtime Discrete Events Simulator with cloud- based MR capability for Manufacturing and Healthcare
5G-Enabled Digital Twin for Manufacturing Shopfloors with 5G Endpoint Modules, Network Harmonisation and Zero Trust Cyber Security.	The 5G-Enabled Digital Twin for Manufacturing Shopfloors taps on 5G to improve cyber security and efficiency. Currently, workers are needed to operate machinery physically on the manufacturing shopfloor. With this digital twin, there is now a reduced need for workers to be physically on site, as they can operate the machinery remotely. This digital twin makes uses of cameras, sensors, and remote control to monitor manufacturing machinery. It consists of 5G Endpoint Modules that allow devices to be connected without a modem and seamlessly pair existing devices with suitable networks (i.e. 4G, Wi-Fi and 5G) for faster data analysis at a lower cost. It also includes a comprehensive cyber security system that provides better cyber security for companies due to the end-to-end data protection mechanisms that 5G offers.	 Digital Twin for Production Shopfloor Graphic for 5G-Enabled Digital Twin for Manufacturing Shopfloors with 5G Endpoint Modules, Network Harmonisation and Zero Trust Cyber Security.

| 5G-Enabled Interactive Digital Signage Kiosks with cloud- based AR/VR capability for Tourism and Retail | Customer interaction with signage kiosks is typically uni-directional – mainly delivering static information.

Having two-way interaction enhances the user experience. Such interaction could include virtual clothing try-ons and interactive AR maps.

However, most current informational kiosks are limited by their less-than-ideal network connectivity. They are unable to process high-speed internet and cannot defend against inherent cyber security risks with current Wi-Fi or 4G technologies.

Without 5G, the effort required to fit kiosks with fibre broadband or 4G connectivity is not feasible, given the infrastructure costs, maintenance efforts, and potential security risks.

But once 5G is ubiquitously available across the country, 5G-Enabled Interactive Digital Signage Kiosks can latch on to the 5G network wirelessly to provide two-way interactive features without risking slow connection. 5G connection also has end-to-end data protection mechanisms, making it more secure as compared to Wi-Fi and 4G technologies.

The 5G-Enabled Interactive Digital Signage Kiosks are developed to improve consumer experience in malls, community centres and tourist spots. These kiosks can power high-processing interactive services like e-shopping, paying bills, trying out products virtually (using 4k quality video and image rendering), interactive AR maps for navigation and more. | Graphic for 5G-Enabled Interactive Digital Signage Kiosks |

| Existing use cases that will be duplicated from APEX5G @ NYP

- Retail use case on Smart Shelf
- Healthcare use case on Emergency Care Units | Earlier launched in Jan 2020, the APEX5G @ NYP is an all-in-one facility for training talent, industry co-development, and testing new use cases.

Some of the use cases include:

The Smart Shelf, which allows retail companies to react proactively to customer needs. The shelf taps on 5G to enable facial recognition to log customers directly into their membership accounts. It will also provide services like checking out items, recommending products of interest and analysing customer behaviour. This makes data collection for retail companies more seamless and fuss-free. They can act on retail issues like merchandising, store experience and point of sale quickly.

Emergency Care Units, where facial recognition enables emergency care patients to be registered into the medical system on the spot. 5G's high bandwidth also supports behaviour tracking systems, which use video cameras to monitor patients during their post-operation recovery period. These cameras can pick up abrupt medical conditions or sudden changes in vital signs of patients, for instance while waiting to be attended to in A&E, and alert doctors. This will allow doctors to react and attend to the patients on time.

Furthermore, wearable technology (i.e. smart devices worn on users) taps on 5G connection to enable mass connection of thousands of devices to the cloud, a significant increase compared to its 4G or Wi-Fi predecessors. This reduces delays in the smart devices and allows a more seamless connection to the cloud. | |