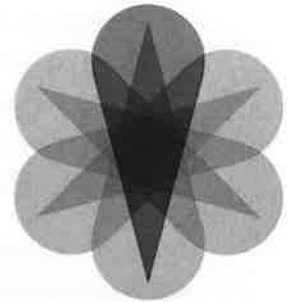


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Aileen Chia (Ms)
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Dear Ms Chia

RE: Second Consultation on 5G Mobile Services and Networks

Juniper Networks is honored to submit these comments in response to the Infocomm Media Development Authority's (IMDA) public consultation on the appropriate regulatory frameworks and policies for 5G. We recognize IMDA's critical role in facilitating 5G network rollout and identifying innovative 5G applications and services for Singapore. To that end and to achieve the true benefits of 5G, IMDA policies could encourage the development of 5G-critical IP networks based on open standards and encourage multi-vendor interoperability testing.

By way of background, Juniper Networks is a leading provider of network infrastructure products and services spanning routing, switching, and security. We proudly consider as partners and customers major service providers, enterprises, and government agencies across Singapore.

5G is poised to offer significant benefits to consumers and businesses through the anticipated deployment of digital health services, digital education, IoT, and connected vehicles. At the same time, the massive increase in the number of devices and demand for bandwidth related to such use cases will impose significant pressure on network infrastructure, not just the radio access networks but also the underlying IP networks that Juniper architects.

To maximize the benefits of 5G technology for consumers and enterprises and to safeguard network security and resiliency, we recommend that the IP networks that underpin 5G be based on industry-led, open standards instead of proprietary standards. This is because open standards provide greater product choice and lower cost, superior interoperability and enhanced security.

Because any manufacturer can develop its products based on open-standard protocols (and all the major network infrastructure manufacturers are able to), customers that use open-standard protocols as one of their criteria have more product options than customers relying on proprietary standards. With increased



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competition and choice comes lower costs for customers. End users can spend less on their networks and spend more on their employees, customers, and innovation.

In addition, a provider's network infrastructure must be seamlessly interoperable with that of any potential customer or partner. Network infrastructures based on proprietary protocols require complex (and time consuming to implement) gateways for interoperability. This is particularly concerning where enterprises are involved in public safety or national security. Interoperability issues can result in severe operational impact and the loss of life.

Protocols based on open standards can improve a network's security posture. This is because open standards enable the integration of solutions from multiple sources, so end users can choose the best-of-breed products for each of their specific networking needs.

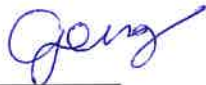
An enterprise can avoid the situation where a vulnerability in one product will affect the entire organization. If all devices deploy the same software implementation, the network is subject to a 'single point of failure' that can cause significant negative consequences, including network outages and data compromises. To make the matter worse, the result often is diminished business reputation and loss of customers.

Finally, to ensure that a 5G network is seamless and consists of elements (e.g., RAN, transport, security, and mobile packet core) that are interoperable, IMDA could encourage interoperability testing among providers for all such elements. For example, Juniper works openly and conducts interoperability testing of mobile packet core solutions with a large ecosystem of 5G partners so that customers can build a best-of-breed end-to-end 5G network.

For these reasons, we recommend that IMDA consider the importance of open standards and interoperability testing in its 5G policies. Thank you for your consideration of these views. If you have any questions, please feel free to contact me at djgoh@juniper.net or +65 65113542.

Sincerely,

JUNIPER NETWORKS (SINGAPORE) PTE LTD



By:
Name: DJ GOH
Title:
Date: 17 June 2019

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