Written evidence submitted by David Hanke on behalf of:

Airspan	**Altiostar**	**GigaTera Communication**
Mavenir	**Microelectronics Technology Inc. (MTI)**	**NEC Corporation**
Parallel Wireless	**Super Micro Computer, Inc.**	**World Wide Technology**

We write today to commend you for your clear-eyed leadership in launching a committee inquiry into the security of the UK's 5G networks and to call to your attention a new and better path that, if followed, would both help safeguard the UK's national security and advance its economic interests. In short, the UK now has the opportunity to put in place the most technologically advanced 5G infrastructure without needing to rely at all on "high-risk vendors."

With your inquiry, you have invited input on the issue of whether, and to what degree, it is possible to exclude certain high-risk vendors' technology from the most sensitive parts of the UK's 5G network while allowing them to supply peripheral components. The context for this question is the recent decision by the UK's National Security Council to allow high-risk vendors to build substantial portions of your country's 5G network, including mobile phone masts and antennas. This approach, which allows high-risk vendors to build 35 percent of your 5G infrastructure while excluding them from "core" parts of the network, will require the UK to assume significant national security risks. It fails to recognize that the dangers present in 5G systems are uniquely different from those present in 4G. In 5G, the "edge" will be a mix of core functions and radio functions, with no clear demarcation between the two domains. All parts of a 5G network will handle sensitive data, so there is no safe place for equipment from high-risk vendors. Therefore, nothing short of a full ban on gear from high-risk vendors will address the inherent risks.

You have also invited input on the question of whether "credible alternatives" to certain high-risk vendors' systems are currently available. The clear answer is yes. Virtualized open radio access network (ORAN) architecture is ready now and represents the logical path forward for the UK. With 5G, the traditional rules of mobile architecture are changing, and a long-overdue global evolution to virtualized ORAN architecture is now underway. This new architecture will inject into the supply chain interoperable components from a much wider variety of suppliers, enabling greater functionality and enhanced security in 5G systems, as well as transformational applications of this technology.

The range of services provided by mobile networks will expand dramatically in the future to encompass activities well beyond voice and data communication, such as controlling critical infrastructure, manufacturing, and the flow of sensitive personal data from individuals to cloud services. As this dramatic transition unfolds, the number of devices connected will explode and the network will face new challenges, based on the need to behave differently depending on the user profile and the user application. This is a problem that nations and their mobile carriers will not solve by continuing to build "mainframe" networks of custom software running on custom hardware from a single vendor, which is what the legacy vendors would have you do.

The solution, which is technologically mature and available today, is to move to a software-intensive webscale architecture with open interfaces, disaggregating the hardware and software to allow a multivendor solution that combines the best-of-breed for each element of the network and enables the use of commercial off-the-shelf components. This is the essence of virtualized ORAN architecture. The mobile industry must undergo the same transformation that has immensely benefitted the IT industry by virtualizing and "cloudifying" the software and, with open standards, multiplying the cast of industry players who can bring innovative solutions to the network. Nations that adopt virtualized

ORAN architecture will leapfrog those perpetuating the mainframe model. With this innovation, British mobile carriers would benefit by deploying modular software-defined mobile networks that are more flexible and less expensive. This new architecture would also allow your carriers much greater control and visibility to ensure the security of the information.

Dr. Ian Levy, the Technical Director of the UK's National Cyber Security Centre, wrote earlier this year about the ongoing development of an ambitious strategy to help diversify the 5G supply chain in order to "attract established vendors who are not present in the UK, supporting the emergence of new, disruptive entrants to the supply chain, and promoting the adoption of open, interoperable standards that will reduce barriers to entry." We are some of those very vendors and entrants, and we stand ready today to deliver 5G systems for the citizens of the UK. In fact, virtualized ORAN will allow a myriad of global companies to participate in this market, not just the legacy vendors. As of today, this includes more than 30 market-leading software and services companies, radio and server providers, and chip vendors from the U.S. and other trusted allies. Such a vibrant ecosystem of suppliers – ranging from small, young enterprises to Fortune 50 companies – will enable British mobile carriers to control the supply chain and allow British companies to play a role in supplying network components.

By building its 5G networks with equipment from high-risk vendors, which use only proprietary technology and closed architecture, the UK would not only be precluding opportunities for UK companies. It would also limit its future opportunities to upgrade to state-of-the-art 5G infrastructure and pass up the chance to leverage the substantial supply chain described above and foster healthy competition.

We also understand that British mobile carriers may be concerned about higher costs if high-risk vendors are indeed banned, but a virtualized ORAN approach would actually be less expensive. By combining commercial off-the-shelf servers with best-of-breed radios from multiple suppliers, your carriers can reduce their capital outlay by at least 30%. They can also cut their operating expenses by a comparable margin. The reasons are simple: this architecture lends itself to the same level of automation as IT cloud to reduce the deployment time from days and weeks to minutes and hours, and it also allows for reduction of equipment at the radio site and elimination of custom hardware. Together, these reduced costs would allow carriers to expand the reach of their 5G networks within the UK at a faster pace.

You may wonder why – if virtualized ORAN is such a good solution for the UK's 5G networks – other nations have not already adopted this architecture. In fact, a dozen other nations have already begun to make the transition. Virtualized ORAN has been successfully deployed on a smaller-scale in commercial 4G networks in Mexico, Turkey, and Italy, as well as the U.S. State of Alaska, and some of those 4G systems will be transitioning to 5G shortly. At the same time, major mobile carriers in nations such as India, Germany, Spain, Brazil, the United Arab Emirates, and several countries in Africa are also moving to implement virtualized ORAN solutions. And, earlier this year, a new carrier in Japan deployed a live, large-scale commercial network for both 4G and 5G, leveraging a virtualized ORAN solution and now supporting over 100,000 mobile users.

Thank you for considering our views as the UK plots its course in this important area. If helpful, we would be happy to come to London to meet and give you a briefing on virtualized ORAN, how it has been successfully implemented in other nations, and what that path might look like for the UK.

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