Cisco Response to
Ofcom Statement on improving spectrum access for consumers in the 5 GHz band
and
Notice of proposal to make Wireless Telegraphy Exemption Regulations 2017

Date of Ofcom statement: 9 March 2017
Date of Cisco response: 11 April 2017

Question 1 – Do you have any comment on the drafting of the Proposed Regulations?

Cisco strongly supports Ofcom's proposal to open 5725-5850 MHz to Wireless Access Systems (WAS) and Radio Local Area Network (RLAN) use. As the consultation document plainly reveals, allowing the band to be used for WAS/RLAN will enable UK consumers and businesses to take better advantage of the current generation of Wi-Fi technology that uses wider channelization. Those channels – at 80 to 160 megahertz wide – are limited in number under the current band plan, with only four 80-MHz channels available and only two 160-MHz channels available. These wider channels, together with other technology improvements such as advanced MiMO antenna technology, enable improved spectrum sharing and spectrum re-use by IEEE 802.11ac devices in comparison to previous generations of technology. With the UK today limited to a spectrum band plan that is less friendly to current generation technology than it could be, Ofcom is right to consider opening 5725-5850 MHz to WAS/RLAN use, which will enable six 80-MHz wide channels.

Those additional channels are needed to meet rising consumer and business demand. Cisco's most recent Mobile Visual Networking Index (VNI) forecast, released in February 2017, shows that Wi-Fi continues to be the workhorse for Internet connectivity. In the UK:

- Of all IP traffic (fixed and mobile) in 2016, 51% was Wi-Fi, 45% was Wired, and 4% was mobile. Of all IP traffic (fixed and mobile) in 2021, 60% will be Wi-Fi, 30% will be Wired, and 9% will be mobile.
- Fixed/Wi-Fi IP traffic will reach 4.5 Exabytes per month in 2020, up from 1.4 Exabytes per month in 2015.
- 73% of the United Kingdom's mobile data traffic was offloaded in 2016. 75% of the United Kingdom's mobile data traffic will be offloaded by 2021, driven by increasing amounts of offloading from both smartphones and tablets.

As Cisco has repeatedly stated, this upward demand pressure is driven by the ever-increasing use of video applications, including higher resolution video, live video, virtual reality, etc. Faster networks, more powerful devices, and the steep growth projections for Internet of Things are also important contributing factors. It is no surprise, therefore, that participants in the Wi-Fi ecosystem are enthusiastic about Ofcom's proposal to make additional spectrum

available. In fact, because the 5725-5850 MHz band has long been open to WAS/RLAN use in other nations, the equipment is readily available. Cisco agrees with Ofcom's conclusion that there is no compelling reason not to open the band.

Cisco further agrees that coexistence issues are very manageable through selection of technical parameters, although we urge, in response to the second consultation question, that Ofcom adopt a higher power level of 250 mW EIRP. We appreciate and support Ofcom's decision to use more realistic upper bounds of Wi-Fi use in calculating coexistence with satellite uplinks. We urge Ofcom to carefully review whether Dynamic Frequency Selection (DFS) technology is necessary if there are virtually no incumbent radar systems to protect. If Ofcom nonetheless elects to impose DFS requirements, Cisco greatly appreciates Ofcom's commitment to align the DFS requirements with those contained in the ETSI standards EN 301 893 and EN 302 502. However, we would also like to encourage Ofcom in keeping the DFS requirement under further review. We remind Ofcom that DFS is not cost-less in that even without the presence of active radar, DFS can tend to force equipment to non-DFS channels since packet collisions and other radio noise can mimic radar signals. DFS, therefore, should be deployed only when there are incumbents to protect. Cisco further agrees that politeness protocols in Wi-Fi will address interference issues with respect to Broadband Fixed Wireless Access users, which has been the experience in the United States. We agree that interference between indoor Wi-Fi and Wireless Industrial Applications can be managed by the enterprise deploying these technologies and that there should be no issues with road tolling at 5795-5815 MHz.

Ofcom notes that the expansion of spectrum available for Wi-Fi will make a significant difference to the user experience, and Cisco agrees. That observation is true from a number of perspectives – the faster and more efficient 802.11ac technology helps alleviate congestion, and regulations should allow for its use to be optimized; the wider channels will better support video applications that are becoming more data-intensive over time and that consumers increasingly use; robust use of 802.11ac also helps promote the deployment of the Internet of Things, with the "things" to be connected substantially dependent upon Wi-Fi. Cisco agrees that equipment to take advantage of the new rules is already in existence and could be updated to open the band with software or firmware updates.

Cisco appreciates Ofcom's attention to the "low hanging fruit" of 5725-5850 MHz in the 5 GHz band. We also encourage active consideration of medium term goals and longer term goals cited in the consultation to make more 5 GHz spectrum available for this widely-used technology.

Question 2 – Do you have any comments on the proposed technical regulations?

The Consultation document proposes to set maximum power levels at 200 mW EIRP and further restricts emissions by proposing a ban on fixed outdoor transmitters. In Cisco's view, Ofcom is being overly conservative. These rules may fail to fully achieve the stated objective of making better use of the spectrum band for 802.11ac devices. A maximum power level of 200 mW EIRP is far less than the adjacent band, which allows for up to 1W EIRP. If Ofcom is unwilling to allow 1W EIRP (a result Cisco prefers), then we suggest the proposed rule be amended to allow devices to operate at up to 250 mW EIRP. At that level, it is easier to enable indoor Wi-Fi networking. Moreover, the broad channelization of 802.11ac devices is better supported if devices utilizing 5725-5850 MHz could be allowed up to 250 mW EIRP in that devices could span an additional 160-MHz wide channel if operating at 250 mW EIRP.

If devices are allowed to operate at up to 250 mW EIRP, it is true the satellite protection exceedances contained in Annex 6, Table 3 will change, but there should still be ample protection for satellites. Given that the vast majority of devices operate indoors, path loss through roofing materials substantially limits the energy that satellites will see on the uplink side. Cisco further agrees that satellites are already well protected from harmful interference, and that the addition of RLAN energy will not harm satellites. As the consultation states, for interference to occur, there has to be a significant increase in the number of satellites, those satellites must be operating close to their minimum signal to noise ratio, the "conservative" projections for Wi-Fi usage (in the term "conservative" is used here, projections showing extremely heavy RLAN use such as busy hour, band loading, activity factors) would have to be true.

Ofcom should also evaluate the use of an elevation mask for fixed outdoor Aps as the US has done in 5150-5250 to protect satellite uplinks. This might allow outdoor power levels to increase to up to 1W EIRP. By limiting RLAN energy to the horizontal plane through the use of an elevation mask, satellites can be protected. In fact, use of an elevation mask may enable Ofcom to determine that 1w EIRP is possible without causing interference to even the most sensitive satellites. Under this approach, transmitters could operate at 250 mW EIRP (as above) or 200 mW EIRP (as proposed) without an elevation mask, and fixed outdoor access points at up to 1W with an elevation mask.

The consultation provides that the 'overlapping' channels falling within the 5470-5730 MHz band will be able to operate at up to 1W EIRP while the new 'non-overlapping' channels in the 5725 to 5850 MHz will be able to use only 200 mW EIRP. Cisco supports this proposal in general, but in addition, we would like Ofcom to consider increasing the EIRP further to 250mW for the new 'non-overlapping' channels. As above, we also support a further examination of the use of antenna elevation masks for outdoor access points.

With respect to DFS, the consultation proposes a new "Voluntary National Specification" that references the current DFS mechanism as contained in EN 301 893 and EN 302 502. Cisco agrees this is a good solution that allows industry to take immediate advantage of the new

spectrum made available in the UK, while ETSI will work on a revision of the current version of EN 301 893 to take into account the new spectrum allocation for the UK.

As Cisco understands the proposed VNS, the requirements are as follows:

Devices – spectrum utilization	**DFS requirements**
Non-overlapping channels in 5725-5850 MHz	DFS detection *threshold* as in ETSI EN301 893 (current RLAN requirements) DFS *radar patterns* as in ETSI EN 302 502 (current Broadband Fixed Wireless requirements)
Non-overlapping channels in 5470-5725 MHz	DFS *detection threshold* as in ETSI EN 301 893 DFS *radar patterns* as in ETSI EN 301 893
Overlapping channels in 5470 – 5730 MHz	DFS *detection threshold* as in ETSI EN 301 893 DFS *radar patterns* as in EN 301 893 and EN 302 502

Cisco supports these proposals.