

DRAFT Designated Vendor Direction under section 105Z1 of the Communications Act 2003, given to [Public Communications Providers]

(produced for the purposes of a proposed consultation pursuant to section 105Z3(1) of the Communications Act 2003)

Background

1. Section 105Z1(1) of the Communications Act 2003 (“the Act”) provides that the Secretary of State may give a ‘designated vendor direction’ to a public communications provider if he considers that it is necessary in the interests of national security. Such a direction may impose requirements on a public communications provider with respect to the use of goods, services or facilities supplied, provided or made available by a ‘designated vendor’ specified in the direction.
2. On [DATE], the Secretary of State issued a ‘designation notice’ under section 105Z8 of the Act, designating Huawei Technologies (UK) Co., Limited and its affiliated companies (together, “the Huawei corporate group” or “Huawei”) for the purposes of a designated vendor direction.

The Designated Vendor Direction

3. **The Secretary of State hereby imposes the following requirements, in accordance with Section 105Z1 of the Act, on [Public Communications Providers], with respect to the use of goods, services or facilities supplied, provided or made available by Huawei.**
4. **Accordingly, [Public Communications Providers]:¹**
 - (1) **at any time after the date of this direction, must not make use of any Huawei equipment in their 5G networks if such equipment was procured after 31 December 2020;**
 - (2) **at any time after the date of this direction, must not make use of any Huawei equipment, except for fixed fibre access equipment, in any network if the manufacturing process or supply chain for such equipment has been altered**

¹ A table summarising the requirements imposed on [Public Communications Providers] is produced at Annex C to this Direction.

as a result of changes to the United States Foreign-Produced Direct Product Rule announced on 19 May 2020 and 17 August 2020;

- (3) at any time after 31 March 2021, must not make use of Managed Services provided by or on behalf of Huawei in respect of any network, except where Specialist Maintenance Services are provided by or on behalf of Huawei in relation to Huawei equipment which was installed in the network prior to 31 March 2021.
- (4) at any time after 30 September 2021, must not install, or allow to be installed, any Huawei equipment in 5G networks, except where such installation is for the purposes of directly maintaining Huawei equipment installed before this date.
- (5) at any time after 28 January 2023, must not make use of Huawei equipment or any services delivered by, or on behalf of, Huawei in the execution of their Core Network Functions.
- (6) at all times after 28 January 2023, must restrict the use of Huawei equipment in their 5G networks, so that:
 - i. Huawei equipment serves at most 35% of each class of 5G Base Station sites on any particular 5G access network, calculated by the method specified at Annex B.1 to this Direction;
 - ii. the network traffic volume passing through Huawei equipment in any particular 5G access network is at most 35% of the total expected network traffic volume for that particular 5G access network, calculated by the method specified at Annex B.2 to this Direction; and
 - iii. in relation to any other functions which are part of the 5G access networks, at most 35% of the network elements from a particular equipment class in any particular network is provided by Huawei, calculated by the method specified at Annex B.3 to this Direction.
- (7) at all times after 28 January 2023, must restrict the use of Huawei equipment in their Fibre to the Property (FTTP) and other gigabit and higher capable access networks, so that:

- i. at most 35% of premises passed by a network are served by Huawei equipment, calculated by the method specified at Annex B.4 to this Direction; and**
 - ii. in relation to any other functions which are part of the networks, at most 35% of the network elements from a particular equipment class in any particular network is provided by Huawei, calculated by the method specified at Annex B.3 to this Direction.**
- (8) at any time after 28 January 2023, must not make use of Huawei equipment or any services delivered by or on behalf of Huawei in parts of mobile access networks which could provide service to subscribers located within Sites Significant to National Security.**
- (9) at any time after 31 December 2027, must not make use of Huawei equipment or any services delivered by, or on behalf of, Huawei in any part of its 5G networks.**
- (10) to the extent that use of Huawei equipment or services in any network is not otherwise prohibited by the requirements set out above, must comply with the provisions for public telecommunications providers detailed in the National Cyber Security Centre’s (NCSC’s) specific mitigation strategy for Huawei (as it applies from time to time), insofar as the mitigation strategy requires that:**
 - i. [Public Communications Providers] must not use Huawei equipment unless:**
 - 1. any such equipment has first been provided to the Huawei Cyber Security Evaluation Centre (“HCSEC”);**
 - 2. all information relating to such equipment (including information in relation to the tooling used in its production) that the NCSC specifies from time to time as necessary for the purposes of HCSEC effectively evaluating its quality and security, has been provided to HCSEC; and**

v. **[Public Communications Providers] must ensure that any access, whether physical or remote, to any of their networks is not granted to Huawei employees or individuals acting on behalf of Huawei, except where:**

1. in the case of physical access to [Public Communications Providers'] networks, such employees or individuals are accompanied by employees of the [Public Communications Provider] which the [Public Communications Provider] reasonably considers to be appropriately skilled to monitor any national security risks arising from the provision of such access; or

2. in the case of remote access to [Public Communications Providers'] networks:

a. except for the purposes of providing Specialist Maintenance Services, access is undertaken from within the United Kingdom; and

b. access is monitored in real time by employees of the [Public Communications Provider] which the [Public Communications Provider] reasonably considers to be appropriately skilled to monitor any national security risks arising from such access.

vi. **[Public Communications Providers] must take all reasonable steps to enable testing and analysis of any Huawei equipment used within its networks as is reasonably required by the NCSC from time to time.**

5. This Direction shall come into force at midnight on [DATE].

Reasons for the Direction

6. The Secretary of State considers that the Direction is necessary in the interests of national security and therefore satisfies the condition at section 105Z1(2)(a) of the Act, for the following reasons:

- (1) The Huawei corporate group is headquartered in, and controlled from, China. The Government assesses that the Chinese State and associated actors have carried out, and are expected to continue to carry out, cyber-attacks against the United Kingdom and the United Kingdom's interests. In particular, the Chinese State and its associated actors continue to seek to exploit weaknesses in telecommunications service equipment, and/or in how providers of public electronic communications networks build and operate their networks, in order to compromise their security.
- (2) Chinese laws, including the National Intelligence Law 2017, permit the Chinese State to require companies based in China and their employees to engage in activities which are harmful to the United Kingdom. The way in which the rules are operated means such companies can be required to direct their subsidiaries to engage in activities which are harmful to the United Kingdom. Huawei's employees can also be required to comply with directions issued by the Chinese State without the knowledge of Huawei. These powers give rise to a risk that covert and malicious functionality could be embedded in Huawei's equipment. This risk will further increase if the United Kingdom's dependency on Huawei for the provision of Fibre to the Property (FTTP) networks and Mobile Access (MA) networks increases.
- (3) The cyber security and engineering quality of Huawei's products and services is low and its processes are opaque, giving rise to a real risk of hostile exploitation and/or systemic failures. In this regard, the Huawei Cyber Security Evaluation Centre Oversight Board has raised significant concerns about Huawei's engineering processes in its 2018, 2019 and 2020 annual reports.
- (4) The Secretary of State's concerns over the quality of Huawei's products and services have been exacerbated by sanctions imposed by the United States against Huawei. These sanctions are likely to reduce the reliability of Huawei's products and services and to make it harder to remedy any deficiencies. Further:
 - i. As a result of changes to the United States' Foreign-Produced Direct Product Rule in May 2020 and August 2020, set out in the Export Administration Regulations made under the US Export Control Reform Act 2018, Huawei is now unable to purchase or manufacture equipment, in particular semiconductors, where they are designed or produced using specified United States technology, unless companies or persons

supplying Huawei with goods containing such technology have applied for, and been granted, a licence to do so by the United States Government. There is a legal presumption of denial of any application for a licence and, for items such as semiconductors for 5G equipment, it is not anticipated that any such licences will be granted. As a result of this serious impact on Huawei's manufacturing processes and supply chains, Huawei will be forced to manufacture semiconductors and other equipment with unknown and untested tools under extreme time pressures. Because these tools are untried and untested, adequate oversight is significantly more challenging and potentially impossible.

- ii. The ongoing effect of sanctions, the risk of future enforcement and escalation of those sanctions, as well as the expiry in August 2020 of the 'Temporary General License' granted by the United States (which permits some supply to Huawei), have the potential to affect, without advance notice, Huawei's ability lawfully to provide Managed Services (support and maintenance services which are designed to ensure the continued day-to-day operation of networks).
- iii. As a result of the impact of US sanctions, Huawei is now expected to move significant aspects of its supply chains to China and is increasingly reliant on the use of Chinese technology. As a result, in its involvement in the United Kingdom's Fibre to the Property (FTTP) networks and Mobile Access (MA) networks, Huawei is increasingly reliant on unknown and untested components. This raises serious national security concerns.

(5) Huawei has a significant market share in the United Kingdom's FTTP and MA networks, estimated at 44% and 35% respectively. In light of Huawei's size and the scale of its operations, it has the ability to increase its market shares in the FTTP and MA networks in a way which creates a significant risk of national dependency. Without intervention, it is highly likely that the United Kingdom will become dependent on Huawei for the provision of FTTP and MA networks. These networks form part of the United Kingdom's critical national infrastructure. Due to the national security concerns set out at sub-paragraphs (a) to (d) above, dependency on Huawei significantly increases the potential impact of any

systemic failures or hostile exploitation and therefore gives rise to unacceptable risks to national security.

7. The Secretary of State considers that the requirements imposed by the Direction are proportionate to what is sought to be achieved by it, and therefore satisfy the condition at section 105Z1(2)(b) of the Act for the reasons set out below.

(1) Use of Huawei equipment procured after 31 December 2020 in 5G networks

8. The Direction requires the overall phasing out and ultimate termination of Huawei's involvement in 5G networks in the interests of national security. The use by Public Communications Providers of Huawei equipment procured after 31 December 2020 in 5G networks would undermine this overall aim. This requirement ensures that Public Communications Providers remain on the 'pathway to zero' by discouraging them from procuring, and therefore installing in their 5G networks, new Huawei equipment, and encouraging them to procure new equipment from other vendors.

(2) Huawei equipment which is affected by changes to the US Foreign-Produced Direct Product Rule

9. As a result of changes to the United States Foreign-Produced Direct Product Rule, Huawei is unlikely to be able to continue relying on US technology and software in the design and production of its equipment, in particular semi-conductors. These developments will force significant changes to Huawei's manufacturing processes and supply chains, which in turn will mean that effective oversight over Huawei equipment supplied to the United Kingdom will become more challenging, or even impossible.

(3) Receipt of Managed Services

10. Managed Service arrangements give providers significantly higher levels of access to networks and/or sensitive data transmitted via or stored in such networks than most other service relationships. The level of access is such that a Managed Service provider has the potential to cause major network disruption and/or access quantities of sensitive data on a scale which undermines national security. In light of this threat, the Secretary of State considers that the national security risk of Huawei providing Managed Services is unmanageable. This risk has been further exacerbated by a series of United States sanctions imposed on Huawei, which have the potential to affect, without advance notice, Huawei's ability lawfully to undertake any Managed Service arrangements.

11. The Secretary of State considers that the implementation date of 31 March 2021 is achievable, and is necessary given the seriousness of the security risks of a longer period for compliance.

(4) Installation of Huawei equipment in 5G networks after 30 September 2021

12. The Direction requires the overall phasing out and ultimate termination of Huawei's involvement in 5G networks in the interests of national security. The installation by Public Communications Providers of Huawei equipment after 30 September 2021 would undermine this overall aim. This requirement ensures that Public Communications Providers remain on the 'pathway to zero' by encouraging them to install equipment produced by other vendors.
13. The cut-off point of 30 September 2021 is intended to give Public Communications Providers sufficient time to prepare for installation of equipment produced by other vendors; bearing in mind that factors such as the continued outbreak of Covid-19 or environmental interruptions (for example, flooding) might prevent Public Communications Providers from complying with an earlier date. The Secretary of State also considers it proportionate to exclude from these requirements installation of Huawei equipment for the purposes of maintaining equipment installed before 30 September 2021.

(5) Use of Huawei equipment or any services delivered by, or on behalf of, Huawei in the execution of Core Network Functions

14. The network 'core' is where critical functions are carried out and where the most sensitive data about a network's users is stored. Disruption to Public Communications Providers' Core Network Functions could lead to significant interference with the operation of the network, including widespread loss of services, and significant data breaches. Because of the importance and sensitivity of the Core Network Functions, Huawei's cyber-security risk profile cannot be managed.
15. Pursuant to this Direction, the Secretary of State has given affected operators until 28 January 2023 to phase out Huawei involvement in their Core Network Functions. This provides sufficient time for Public Communications Providers to switch to new vendors without incurring the risks associated with rapid vendor change, whilst also balancing the

risks of allowing Providers to retain Huawei involvement in Core Network Functions in the short-to-medium term.

(6) 35% cap on use of Huawei equipment in 5G access networks; and (7) 35% cap on use of Huawei equipment in FTTP and other gigabit and higher capable access networks

16. These Directions are necessary to reduce Public Communications Providers' dependence on Huawei in the medium-term and to place them on a path to removing Huawei equipment in the longer term. However, placing the cap at lower than 35% or introducing an earlier deadline would risk the resilience of UK networks, given the current lack of diversity of supply in the market. The Secretary of State has therefore sought to balance the imperative of reducing Huawei equipment with the need to protect the medium-term resilience of the UK network.

(8) Sites Significant to National Security

17. This element of the Direction is required because there are locations where pure metadata about the number, type and distribution of devices connected to Public Communications Providers' local base stations could be used to establish information which could pose a significant risk to the United Kingdom's national security.

18. The Secretary of State has sought to balance the risk of Huawei having access to parts of mobile networks which could provide service to subscribers located at Sites Significant to National Security with the need to provide Public Communications Providers sufficient time to change their vendor arrangements without suffering from the risks associated with rapid vendor change.

19. Pursuant to section 105Z1(7) of the Act, the Secretary of State is not required to specify the reasons for the direction if, or to the extent that, he considers that doing so would be contrary to the interests of national security. Because public disclosure of the Sites Significant to National Security would give rise to national security risks, they have not been set out in this Direction but have been provided on a confidential basis to the Public Communications Providers subject to the Direction.

(9) Ending Huawei involvement in 5G networks by 31 December 2027

20. The Secretary of State has sought to balance national security risks with the need to provide Public Communications Providers sufficient time to transition to new vendors.

Because 5G networks will be of an even greater importance to the United Kingdom by 2027, and because of the expected availability of more reliable alternative vendors by this date, the Secretary of State considers that Huawei's presence in the United Kingdom's 5G networks beyond 31 December 2027 will constitute an unmanageable and unnecessary national security risk.

21. Further, as explained at paragraph 9 above, Huawei equipment, for which the manufacturing process or supply chain has been affected by changes to the United States Foreign Direct Product Rules, will be produced using untried and untested components which would not be capable of being subjected to adequate oversight. As a result, Public Communications Providers will only be able to rely on stockpiles of equipment and parts unaffected by United States sanctions to maintain Huawei involvement in their 5G networks. The Secretary of State considers that, after 31 December 2027, there will no longer be enough spare equipment and parts of a sufficiently high security standard. As a result, there are significant national security risks of allowing Public Communications Providers to continue with Huawei involvement in any element of their 5G networks after this date. Though the existing supply of equipment and spares of a sufficiently high security standard may be exhausted after 31 December 2027, the Secretary of State considers that a longstop date is needed to ensure market certainty and long-term network security.

(10) National Cyber Security Centre's specific mitigation strategy for Huawei

22. Public Communications Providers will still, in certain circumstances, be able to use Huawei equipment and services after this Direction takes effect. Public Communications Providers have overall responsibility to manage the national security risks associated with the use of Huawei equipment and services. However, in accordance with the NCSC's advice, the Secretary of State does not consider that Public Communications Providers are able to do so effectively except within the constraints of a national mitigation strategy overseen by the NCSC. It is therefore proportionate that any ongoing use is subject to the elements of the NCSC's specific mitigation strategy for Huawei that are intended to bind Public Communications Providers.
23. The Direction recognises the key role that HCSEC plays in the Huawei mitigation strategy, and is also intended to ensure HCSEC's continued effective operation. However, the Secretary of State will reconsider the entirety of this Direction in the event that HCSEC is no longer in a position adequately to fulfil its functions.

Interpretation

24. In this Direction:

- a. '5G network' means a set of all relevant network infrastructure elements for mobile and wireless communications technology used for connectivity and value-added services with advanced performance characteristics, such as very high data rates and capacity, low latency communications, ultra-high reliability, or supporting a high number of connected devices. These may include legacy network elements based on previous generations of mobile and wireless communications technology such as 4G or 3G. 5G networks should be understood to include all relevant parts of the network.
- b. '5G Base Station' means any class of base station supporting or routing functionality added in the Third Generation Partnership Project's Release 15 or later releases.
- c. 'Core Network Function' means one of the functions listed at Annex A to this Direction.
- d. 'Huawei equipment' means any product (including non-passive component parts) or software designed, produced, developed, assembled or manufactured by or on behalf of Huawei, which is intended for use as part of a telecommunications network including but not limited to carrier grade telecommunications hardware and enterprise hardware.
- e. 'Managed Services' means support and maintenance services which are designed to ensure the continued day-to-day operation of networks.
- f. 'National Cyber Security Centre' or 'NCSC' means Government Communications Headquarters acting through the National Cyber Security Centre.
- g. A list of 'Sites Significant to National Security' has been provided on a confidential basis to the Public Communications Providers subject to this Direction.
- h. 'Specialist Maintenance Services' means third-line support maintenance for Huawei's equipment which only Huawei can provide.

i. The date on which equipment is 'procured' shall be taken to be the date on which the transaction is initiated.

[Direction given by the Secretary of State]

[DATE]

ANNEX A: List of Core Network Functions

For all mobile and fixed networks, including 5G networks:

- Internet Protocol Core (including any function which performs Internet Protocol/Multiprotocol Label switching or routing across the core of a provider's network);
- Security Functions;
- Operational Support Systems (OSS) (except to the extent necessary to support any Huawei equipment deployed in a provider's network);
- Management and Authentication;
- Authorisation and Audit (AAA) functions;
- Virtualisation infrastructure (including Network Function Virtualisation Infrastructure (NFVI));
- Orchestrator and controller functions (including Management and Network Orchestration (MANO) and Software Defined Networks (SDN) orchestrators/controllers);
- Network monitoring and optimisation;
- Interconnection equipment (including high data rate transmission and routing equipment used to connect core data centres, for peering used to connect operator networks or used over international connections);
- Internet gateway functions; and
- Lawful Intercept related functions.

For all 5G networks:

- 5G core database functions;
- 5G core-related services including but not limited to:
 - Authentication Server Function (AUSF),
 - Access and Mobility Management Function (AMF),
 - Unstructured Data Storage Function (UDSF),
 - Network Exposure Function (NEF),

- Intermediate NEF (I-NEF),
- Network Repository Function (NRF),
- Network Slice Selection Function (NSSF),
- Policy Control Function (PCF),
- Session Management Function (SMF),
- Unified Data Management (UDM),
- Unified Data Repository (UDR),
- User Plane Function (UPF),
- UE radio Capability Management Function (UCMF),
- Application Function (AF),
- 5G-Equipment Identity Register (5G-EIR),
- Network Data Analytics Function (NWDAF),
- Charging Function (CHF),
- Service Communication Proxy (SCP),
- Security Edge Protection Proxy (SEPP),
- Non-3GPP InterWorking Function (N3IWF),
- Trusted Non-3GPP Gateway Function (TNGF),
- Wireline Access Gateway Function (W-AGF); and
- Future 5G core functions as specified by 3GPP TS 23.501.

ANNEX B: calculation of the 35% caps

The following methods are based on the NCSC's FAQs in relation to its January 28 2020 [‘advice on the use of equipment from High Risk Vendors \(HRVs\) in UK telecoms networks’](#), as the FAQs stood on the date this Direction was published.

Annex B.1: calculation of the 35% site cap for 5G access networks

Firstly, operators should classify their sites based upon type (e.g. small cells, macrocells). For example, the ITU has defined five basestation classes within ITU-T K.100. These classes (E0, E2, E10, E100, E+) determine where and how the equipment should be deployed.

Secondly, for each class, operators should determine the size of two sets:

$S_{[class]}$: the set of sites supported by the operator of a particular ‘class’ that are providing Rel-15 or later features or functionality to handsets/UEs. Note that this could include upgraded 4G sites.

$S_{[class]}(Huawei)$ the subset of sites within ‘ $S_{[class]}$ ’ where a non-passive function of the basestation is provided with the involvement of Huawei equipment.

Based upon these sets, operators should ensure that, for every class, the following equation is true:²

$$\frac{\#S_{[class]}(Huawei)}{\#S_{[class]}} \leq 0.35$$

In other words, our advice is that for each class, the percentage of Huawei-supported sites is at most 35%. Correspondingly, at most 35% of small cells and at most 35% of macro cell functions may be provided by Huawei equipment.

Only the sites operated by the operator should be included in this calculation. Consequently, RAN-sharing agreements do not impact this calculation.

For the avoidance of doubt, the cap applies to any sites which are offering ‘5G’ (3GPP Rel-15 or later) features or functionality to handsets. Hence if a site offers any 5G functionality, it is a ‘5G site’ and is included in the cap. ‘Dynamic Spectrum Sharing’ across 4G and 5G is a 5G feature

² Where ‘#S’ is used to denote the size of the set ‘S’.

and hence sites with this capability are included in the cap. However, if it is capable of offering 5G functionality, but these features are disabled, it is not included in the cap.

As an example, if an operator has 20K macro cell sites (class E+) and has updated or upgraded 6K of them to support Rel-15 or later features ($\#S_{E+} = 6000$). If additionally, the operator has 2K small cells (class E10) and installed or upgraded 1K of them to Rel-15 or later features ($\#S_{E10} = 1000$). Then:

$$\#S_{E+}(Huawei) \leq 0.35 \cdot \#S_{E+} = 2100$$

And:

$$\#S_{E10}(Huawei) \leq 0.35 \cdot \#S_{E10} = 350$$

Hence, the operator may have up to 2100 Rel-15 or later macro cell sites with non-passive components from Huawei, and at most 350 Rel-15 or later small cell sites with non-passive components from Huawei.

Operators should also ensure that traffic quantities and equipment quantities are also within the cap, as described in Annex B.2 and Annex B.3

Annex B.2: calculation of the 35% traffic cap for 5G access networks

The traffic cap should be calculated based on the total traffic passing through ‘5G’ sites over a year. It is based on the traffic routed over the network from UEs within the following two sets:

U: The set of UEs where the operator’s RAN is offering features or functionality defined in 3GPP Rel-15 or later.

U(Huawei): The subset of UEs within ‘U’ where some non-passive aspect of basestation connectivity has the involvement of Huawei equipment. To be clear, where a UE is supported by multiple basestations, involvement of Huawei equipment in either function would cause the UE to be within the set. In the case of 5G Option 3A, this would apply if Huawei equipment is involved in either the eNB signalling anchor, or the gNB carrying 5G traffic.

Based on these sets, operators should ensure that the following equation is true:³

$$\frac{\sum_{year} |U(Huawei)|}{\sum_{year} |U|} \leq 0.35$$

The advice applies to traffic going over the operator’s RAN regardless of the destination core network, or the customer relationship. Traffic from another operator’s RAN is not included in the calculation, but MVNO or RAN-share traffic going over the operator’s own RAN is included.

For the avoidance of doubt, the traffic quantities are only calculated for handsets offered any 5G (Rel-15 or later) functionality, regardless of whether the handset uses that offered functionality. Hence, it will generally be calculated based on the amount of traffic going through the ‘5G sites’ identified in Annex B.1. However, if a UE is passing traffic through both 4G and 5G sites (e.g. 5G’s Non-Stand Alone Option 3), that UE has been offered a ‘5G’ feature and all that UE’s traffic should be included in the cap, regardless of whether the traffic is routed through a 4G or 5G basestation.

As an example, if the operator routes 10PB of data over a year, from UEs which are being offered Rel-15 or later features by the network, then $\sum_{year} |U| = 10PB$. In this case:

³ Using the notation that $|U|$ is the traffic routed over the network from UEs within the set U, and $\sum_{year} |U|$ is the traffic routed over the network throughout a year from UEs within the set U.

$$\sum_{year} |U(Huawei)| \leq 0.35. \sum_{year} |U| = 3.5PB$$

Consequently, over the course of that year, the operator may route up to 3.5PB from UEs offered Rel-15 or later functionality, where the support of a Huawei function is utilised.

Where the precise traffic quantities cannot be calculated, then the use of reasonable, unbiased estimates of traffic quantities over network elements are sufficient.

Operators should also ensure that site numbers and equipment quantities are also within the caps, as described in Annex B.1 and Annex B.3.

Annex B.3: calculation of the 35% cap for network elements from a particular equipment class of 5G, FTTP and other gigabit or higher capable fixed access networks

This cap is intended to apply to physical quantities of equipment. Operators should determine the size of two sets:

$E_{[class]}$: the set of the operator's physical equipment of a particular 'class' performing a function within the 5G access network or the FTTP and other gigabit or higher capable fixed access networks.

$E_{[class]}(Huawei)$: the subset of physical equipment within 'E[class]' where a non-passive function of the equipment is provided with the involvement of Huawei equipment.

Based upon these values, operators should ensure that, for every class, the following equation is true:⁴

$$\frac{\#E_{[class]}(Huawei)}{\#E_{[class]}} \leq 0.35$$

Only the operator's equipment should be included in this calculation. Other operator's equipment should not be included, even if the operator uses this equipment to support part of their network.

Classes of equipment are deployment dependent, but as an example, the following may be appropriate equipment classes:

5G: gNB DU, gNB CU, gNB small cell, etc.

GPON: ONT/ONU, OLT

Operators of fixed networks should also ensure that premises passed are also within the cap as described in Annex B.4. Operators of 5G networks should also ensure that site numbers and traffic quantities are also within the caps, as described in Annex B.1 and Annex B.2.

Given the control set out in 4(5) above, operators must not use Huawei equipment to provide NFVI and hence the 35% cap is not relevant to the physical infrastructure or hypervisor.

⁴ Where '#E' is used to notate the size of the set 'E'.

The use of virtual Huawei functions should then be limited based on number of premises (for fixed access networks as described in Annex B.4), and number of sites and traffic quantities (for 5G networks as described in Question Annex B.1 and Annex B.2).

Annex B.4: calculation of the 35% cap of premises passed by FTTP and other gigabit and higher capable access networks

Operators should determine the size of two sets:

P: The premises passed by the operator using gigabit and higher capable access networks. Typically, each premise will have a unique customer termination point (e.g. ONTs) attached to the network.

P(Huawei): the subset of premises within 'P', where a non-passive function of the access connection (e.g. OLT) is provided with the involvement of Huawei equipment.

Based on these sets, operators should ensure that the following equation is true:⁵

$$\frac{\#P(Huawei)}{\#P} \leq 0.35$$

As an example, if an operator provides a fibre service to 20m homes, presumably with the potential to support 20m active ONTs, then:

$$\#P(Huawei) \leq 0.35 \cdot \#P = 7m$$

Meaning that at most 7m homes may be served by Huawei equipment.

Operators should also ensure that equipment quantities are also within the cap as described in Annex B.3.

⁵ Where '#P' is used to denote the size of the set 'P'.

ANNEX C: Summary of requirements imposed on Public Communications Providers

This table summarises the requirements imposed on Public Communications Providers by this direction. It is used for explanatory purposes only. It does not form part, nor is it intended to provide a comprehensive description, of the requirements imposed.

Paragraph reference	Description of requirement	Relevant date
4(1)	Not to make use of any Huawei equipment in 5G networks if such equipment was procured after <u>31 December 2020</u> .	31 December 2020
4(2)	Not to make use of any Huawei equipment, except for fixed fibre access equipment, in any network if the manufacturing process or supply chain for such equipment has been altered as a result of changes to the United States Foreign-Produced Direct Product Rule announced on 19 May 2020 and 17 August 2020.	Ongoing
4(3)	Not to make use of Huawei Managed Services in respect of any network after <u>31 March 2021</u> , except for Huawei Specialist Maintenance Services provided in relation to Huawei equipment already installed in the network prior to 31 March 2021.	31 March 2021
4(4)	Not to install Huawei equipment in 5G networks after <u>30 September 2021</u> , except for directly maintaining Huawei equipment installed before this date.	30 September 2021
4(5)	Not to make use of Huawei equipment or services in the execution of Core Network Functions after <u>28 January 2023</u> .	28 January 2023
4(6) and (7)	35% cap on use of Huawei equipment in 5G access networks, FTTP networks, and other gigabit and higher capable access networks after <u>28 January 2023</u> .	28 January 2023
4(8)	Not to make use of Huawei equipment or services in parts of mobile access networks which could provide service to subscribers located at Sites Significant to National Security after <u>28 January 2023</u> .	28 January 2023
4(9)	Not to make use of Huawei equipment or services in any part of its 5G network after <u>31 December 2027</u> .	31 December 2027
4(10)	Compliance with the NCSC's specific mitigation strategy for Huawei	Ongoing