Your response

Question	Your response
Question 3.1: Do you have further views about the implementation of STIR?	We agree with the vision that implementing STIR without a Numbering Database decreases its effectiveness. For a successful STIR protocol implementation, we therefore advice that it is supported with a Numbering Database. Within the market there are several examples of implementations that could work for the UK market. https://www.theverge.com/2018/11/8/18075100/t-mobile-spam-callsauthentication-fcc
Question 3.2: Are there any other approaches we should consider for addressing CLI authentication?	We expect that at this point in time the STIR/SHAKEN technology implementation is the best way to prevent spam, robotic and nuisance calls.
Question 3.3: Do you agree a common database would be required to support the implementation of STIR?	Yes, we agree that a common database is required to implement STIR in a successful way. The Number Registration database can also be used to backtrack where fraudulent calls are coming from as well as which networks are most misused. We also advice that a Number Registration is in place to validate the original number holder as well as the current number holder.
Question 3.4: What are your views on using blockchain technology as the basis for a common numbering database to support CLI authentication? What other solutions do you think should be considered and why?	The implementation of Blockchain Technology in either a public or private blockchain environment both has its pros and cons. We advise Ofcom to also review the best practice implementations of Centralized Database Solutions. Blockchain technology in general is a great way to solve technological challenges and share information with involved and not involved parties. However, the Blockchain technology also comes with a few disadvantages which a Common Database solution can prevent. **Public blockchain** When implementing a public blockchain data is visible for all parties. Therefore, anyone can join the blockchain network, meaning that they can read, write, or participate with a public blockchain. This form of a public blockchain in a decentralised form can create private and GDPR issues. Because of the open form no one has the actual control over the network, and they are only secure in the form that the data cannot be changed unless validated on the blockchain.

	For the purpose of Number Portability and Number Management we consider this form of Blockchain less suitable. **Private blockchain** A private blockchain considered as a permissioned networks places restriction on who is allowed to participate in the network and in what transactions. *For the purpose of Number Portability and Number Management we consider this form of Blockchain more suitable.* **Blockchain vs Mesh Topology** Before implementing a Number Portability Centralized Database Solution our company worked on a Mesh Topology based solution. Within this network topology all nodes cooperated to distribute data in the network. The Mesh Topology has a similarity with the current Distributed Ledger Solutions. The biggest disadvantage of the Mesh network was the scalability of the system and the numerous amounts of connections needed to connect to all the nodes. The complexity of the Mesh Topology and supporting this has been the main reason to switch to a centralized solution. Switching numbers within a centralized solution increased maximum accuracy of the stored data, validations and speed of the processes. **CRDB Solution** Based in the information above we advise on the implementation of a CRDB Solution which can be regulated by a UK body. A Centralized Database that contains always the correct information and can be used as a guardian of data quality which will provide better insight to OFCOM and operators in case of violations. *CRDB Number Portability Solutions a worldwide best practice.*
Question 3.5: What are your views on timeframes?	Confidential – N Implementing a new NMS which keeps track of all numbers, and a NP system which keeps tracks of all transactions can be implemented within a shorter timeline, then the overall timelines proposed by Ofcom. Implementing these two topics are key for a successful STIR and ensuring that CLI authentication can be done correctly and validated against correct data. Implementing Number Portability and Number Management system could be done within 6 to 12 months. For the implementation of the STIR technology we expect a similar time is needed. The overall timelines are considered as extraordinary long.
Question 4.1: What are your views	

on the current implementation of number portability in the fixed and mobile sectors?	**Fixed Portability** The current implementation of fixed number portability works far from optimal. It is our believe a centralised system for number portability provides the best and optimal way of porting numbers, and more important keeping track of "where the numbers are" in other words who is currently providing services for a specific number, a block or a numbers range. **Mobile Portability** The Mobile Portability Process from a validation perspective with PAC codes works but could still be simplified and improved. A centralized validation via IVR, SMS, RCS or Web could still bring improvement in the customer experience. We also expect that less actions are needed in the entire chain and that the time for porting will decrease. The overall MNP system can be improved from a managing perspective. Our company can implement both processes according to the same technique and standard which can then be ran from the same system. This will ensure one gatekeeper and standard.
Question 4.2: What are your views on sharing the functionality of a common numbering database for CLI authentication to also support improvements in UK porting processes?	The information stored in a common numbering database is a solution for all three aspects. A CRDB can be easily integrated with Number Portability, Number Management and afterwards it can be used to improve the CLI authentication processes. A combination of the three processes are ideal to solve all issues at once.
Question 4.3: We are currently supporting a blockchain pilot. Do you have any views on using this technology for port transactions and a routing database? Are there other alternatives that should be considered?	In our opinion a centralised database or a so called CRDB solution for number portability is for the users (the licensed operators) as well as the end users the best solution: 1) a cost perspective 2) a knowledge perspective 3) implementation perspective We are not saying a block chain solution is not a possible working solution, however it is new technique not adapted in working environments, and we strongly doubt if such the UK and its licensed operators should adapt in such an early stage this new technique. The skillset needed at all operators to maintain a Distributed Ledger and connect to the Blockchain system shall also prove its difficulties. Not all parties will have the knowledge, capabilities and funding to enter and cohere in this system. A CRDB Solution for NP should therefore be considered. This NP Solution can be linked with the NMS which allows the regulator to easily administer numbers ranges and inventory. The NMS can also help out with billing and automating the request processes for numbers etc. The overall needed knowledge for a CRDB solution and possible funding shall be lower at the average operator where they will still be capable to participate in all

	processes.
Question 4.4: What are your views on implementation timeframes and the importance of a common database solution being available to support the migration of telephony services to IP?	A CRDB implementation normally takes about 6 months. With the changes needed in the UK to implement a new way of working combined with the migration we expect that the actual needed time is between 6 to 12 months. We recently performed a similar migration in Ireland and Nigeria. These proven migrations based on the current technologies within the industry standards made these implementations easier and quicker for the licensed operators. The timeframes overall mentioned in the consultations are extremely long. We are confident that via a standard CRDB process and validations the solution could be active within one year. This will help out the OFCOM as well as all the operators and end users. By implementing the Common Database Solution, the IP transformation will be made smoother cause of better market insights. These insights can provide regular and adequate information in case of issues that might occur within the migration to IP. Not only can Ofcom be informed about current statuses, but the notification systems and ACK/ NACK principles will provide better insights to customers and stakeholders in the whole chain. The Common Database can provide to each operator the current Number Status and Allocation as well as other information.
Question 5.1: What are your views on the potential for a common database solution to also provide shared functionality to support number management?	From a vendor point of view, we state that our CRDB solution for Number Portability is fully compatible with the Number Management System. A regulator will have access to the regulatory demanded information which is divided into hierarchy levels. The Number Portability Environment and Number Management System will be accessible for Operators so that they will have access to their Operator Identity to manage all own number resources. A Number Portability CRDB can be operated besides the Number Management System where all numbers can be stored separately within the two Databases. The information in both systems can be shared for reporting and insight where the configuration and data information is allowed to be shared. Both systems can be fully integrated and support multiple third-party connections. The extensive User Right authentication and hierarchy ensure that each user has access to the granted and licensed identity within the role needed: read only, read and write, Admin as well specific services.
Question 5.2: What do you see as the benefits or disbenefits of changes to number management post PSTN retirement?	The Number Management System is designed for regulators to administer Number Resources and keep track in a simplified way of Number Allocation and its processing. The system covers all types of numbers in a comprehensive and centralized system, ensuring a simple, secure and scalable solution that helps meet all regulatory mandates in the field of

	Number Management and Number portability requirements. Knowing the status of a number free, allocated or reserved etc. will create insight in the number resources and can then prevent number scarcity or the hoarding of inactive numbers. From a regulator point of view an NMS will help manage all facets from the distribution, allocation to the billing if the numbers to the holder. As customer adoption is key for implementing a successful system, our company develops its applications from a user point of view to make them as easy as possible to work with. Therefor our NMS Solution is specifically developed for Regulators and Operators that want to manage their Numbering Resources and automate processes. As the solution is a state-of-the-art system it covers all the basics that a regulator should demand from it. Besides the standard solution functionalities, we always welcome customizations to supply in need tailored for a specific client. Our Number Management System can be fully integrated with the Number Portability System which makes it a two for one solution.
Question 6.1: Do you agree, in principle, with the need to develop and adopt a common numbering database? If not, why not?	We agree with the need in the UK to make the necessary changes in Number Portability, Number Management and Onward Routing. We can solve all three issues with our knowledge in this field and best practice solutions. **NP CRDB** A Number Portability CRDB shall simplify the Number Portability Process in the UK and improve Data Accuracy against lower costs then the current systems. A CRDB Solution will also ensure smoother customer processes and a better customer experience. **NMS System** A NMS System shall create a better overview for the regulator as well as operators about the original owners of Numbers. The NMS System shall help improve Number Resourcing Insight and Billing matters and prevent scarcity of numbers. The combined implementation of a NP CRDB and a NMS system will also assist in the STIR/ Shaken technology and help solve issues around: **CLI Authentication**. **ACQ Routing** Current issues around Onward Routing can easily be overcome when adapting an ACQ routing System. All international players use ACQ routing and the major operators within the UK from a global organisational point of view should be familiar with this way of routing. Implementing ACQ routing based on a Number Portability make before break principle and broadcast message will ensure that loss of service and misrouting of numbers are things of the past.

Question 6.2: If you do not agree with the need to develop and adopt a common numbering database, do you have any suggestions on how the issues we have set out in this consultation could be addressed?	As mentioned above we firmly believe in a common Database solution for the issues addressed.
Question 6.3: Do you agree that in the first instance industry should lead the implementation of a common numbering database, with Ofcom providing support to convene and coordinate key activities? If not, what are your views on how implementation should be taken forward?	Within our industry experience we learned that the best and quickest way to implement a system is when the regulator appoints a party to supply on the demand. Our company can solve the issues mentioned in this consultation and would be able to quickly carry out the improvements when supported by the regulator. 1. Implementing a Numbering Plan and configuring all procedures should take about 6 months. 2. Implementing a Number Portability System from our point of view based on the current market in the UK should take about 6 to 12 months. This is mostly to get all operators aligned and change their systems to a CRDB solution implement business rules and interfaces and process the new way of work. 3. Implementing the ACQ routing systems is aligned in the Number Portability project and combined with the same timeframe. We will maintain the ACQ Database original data and provide Realtime input and updates to each individual connected operator. Operators can then query their own system for direct (correct) routing toward the current operator.