Need for Increased Spectrum Allocation and Investment in Operational Telecommunications to Support Electricity Networks

Position Statement of Strategic Telecommunications Group

Traditionally, in support of the electricity transmission and distribution networks, Operational Telecommunications have only been required to operate singularly, switching remote switchgear and plant to manage the network with the provision of limited monitoring type data from key locations. As electricity networks develop and become more automated and managed systems, Operational Telecommunications have an essential role in maintaining safe and reliable electricity supplies across this Critical National Infrastructure, which is crucial to the long-term economic success of UK plc.

Moreover, the development of 'Smart Grid' functionalities, distributed generation and the consideration for 'Whole System Networks' driven by projects within the Open Networks development of the electricity network means there is now an immediate requirement for Operational Telecommunication systems to facilitate the transfer of increased levels of control and telemetry data. This increased data flow arises from the use of more active network operation, where real time response is required to efficiently and safely manage network capacity. Enhanced Operational Telecommunication systems will allow electricity networks to respond dynamically to increasingly complex and uncertain power flows arising from the flexible generation and use of electricity.

Operational Telecommunications (OT)

The electricity networks are currently managed via centralised control centres, where the various equipment / systems across the network are operated manually by control engineers or automatically by control systems. The OT systems;

- Provide end-to-end communications to remotely monitor and manage assets that are critical and dispersed across the national infrastructure supplying electricity to customers;
- Connect remotely located electricity network assets with centralised control centres and communicate operational data necessary for the safe, resilient and efficient operation of UK plc's electricity networks;
- Assist in keeping customers safe by providing communication channels for automatic tripping and protection elements to disconnect parts of the electricity network when they develop faults;
- Reduce supply interruptions and enable quicker restoration of supplies to customers in the event of electrical faults on the network;
- Facilitate remote operation of equipment, whether manual or automated; and
- Enable voice communications between control engineers and field operatives.

Examples of Operational Telecoms include:

- Switching circuits in and out of service in response to changes;
- Obtaining information from the live electricity network, which can be used for real-time monitoring of the network, typically the voltage and current for feeder circuits.
- Operational type data necessary for the safe operation and monitoring of the electricity network, which is also stored and used by other departments to assist with capacity management.

Without Operational Telecoms, control centres would be:

- Blind to the state of the electricity network and associated equipment;
- Unable to determine whether power is being supplied safely to its customers;
- Lack the capability to switch electricity around the network in order to maintain supplies to customers; and be
- Unable to remotely isolate sections of the electricity network, where the safety of the public could be at risk.

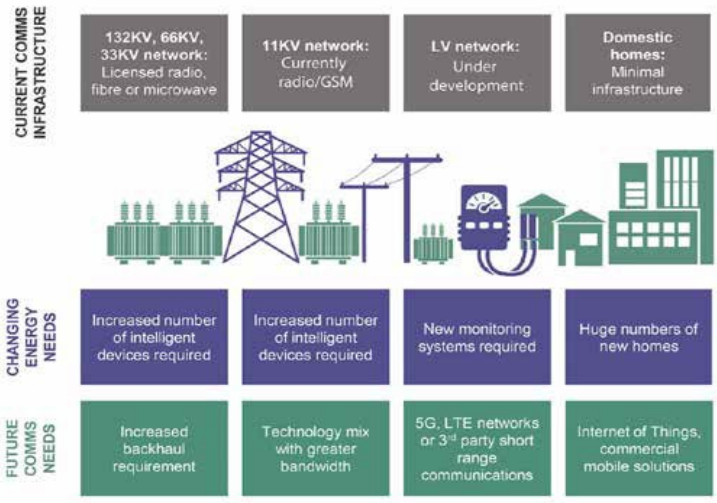
Secure and reliable operational telecommunications ensure that:

- The integrity, efficient operation and safety of the electricity network is maintained.
- Alternative means of supply to customers is facilitated in fault situations.
- The flow of electricity in the network can be monitored and controlled;
- Significant delays to the restoration of supply to all customers, including vulnerable customers and communities is avoided; and
- Connections to distributed generation, energy storage and technology solutions to actively manage the network are able to deliver upon Government Carbon reduction targets, reduce network losses and increase asset utilisation.

Future expectations of operational telecommunications

As Distribution Network Operators (DNOs) transition to become Distribution System Operators (DSOs) they will become responsible for communicating with large volumes of smart grid devices, which will require increased use of the radio spectrum. Hence strategic considerations such as availability, resilience and cyber security are essential, especially where electricity networks are considered to be Critical National Infrastructure.

The rapidly changing supply / demand landscape and the existing demands associated with management and visibility of aging technologies means that investment in new equipment will be required to ensure that the electricity network remains safe, secure and reliable. The embedded figure shows the relationship between the current telecommunications infrastructure, changing energy needs and the future telecommunications capability. Furthermore, whilst current arrangements facilitate wide-scale operation of high-voltage electricity networks, DNOs have virtually no communications arrangements deployed to manage their low-voltage networks. The majority of new communications requirements are linked to smart grid or DSO functionalities and will be deployed on these low-voltage electricity networks.



The communications infrastructure currently in use neither has the capability for the anticipated number of new connections required, nor the bandwidth to accommodate the amount of data expected from each new device.

Access to Radio Spectrum enables Future Operational Telecoms

Access to the radio spectrum by electricity network companies is the most cost efficient and technically appropriate option to facilitate dedicated and robust communications to support the volume of smart grid devices being deployed now and anticipated in the future

An appropriate allocation of spectrum needs to be aligned with the communications needs of the electricity network operators, which:

- takes account of the number of connections anticipated.
- the amount of data traffic to be carried.
- the technical characteristics of the new customer-based technologies being deployed that require more frequent data exchange with larger data packet sizes

In summary, strategic decisions on the allocation of UK spectrum without consideration of the requirements of DNOs and TSOs is likely to have an adverse impact on the ability and cost of delivering electricity supplies to end consumers. Recognising the UK's critical dependence on a reliable supply of electricity for the economic and social well-being of our economy and population, the importance of Operational Telecoms and their dependency on access to the radio spectrum needs to be accorded more recognition and importance within Government.

Narrative Document

A full narrative document providing more detail on the items discussed in this summary developed by ENA Strategic Telecommunications Group consisting of representatives from all UK DNO's and National Grid is available as a free download from ENA website at the link below:

http://www.energynetworks.org/assets/files/ENA%20STG%20Comms%20Brochure_TCL_Final%20v4%20issued.pdf

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