GB Smart Metering – a simple HAN approach

The DECC specification for smart metering has been developed around the assumption that the meters will be 'smart' and the other devices in the system will be relatively dumb. The meters will run the proposed complex tariffs, prepay accounting and supply other devices on the network such the IHD with usage data. The meters are also required to be remotely upgradable to cater for future requirements. The Data Items working group has produced a data dictionary detailing all the objects that have to be transported across the HAN to support the proposed functionality.

SSWG was formed to upgrade ZigBee SE 1.1 to a point where it would carry new commands and attributes to support the British requirements. New features supported include:

- Expanded time of use tariffs from 16 to 48
- Block tariffs
- Combination block tariffs (time of use with block)
- Prepay functionality support
- Snapshot features
- Over the air upgrade
- DLMS tunnelling

All these new features must be interoperable across all suppliers of all components (meters, IHDs, load controllers, etc). The testing must include not only the expected commands and attributes but also combinations that may be incorrect or unexpected. The complex the messages become, the more difficult it becomes to fully assure interoperability.

An alternative approach is to design the system such that the meters simply supply metering data to the communications hub where it can be processed and distributed to other devices such as IHD or load controller. This is how ZigBee SE was originally designed to operate and V1.1 already supports most of the features required for a British system.

In the simple system, the meters store ½ hour data for 13 months as already defined in the GB specification. They supply this data to the communications hub that runs the ZigBee Energy Services Interface (ESI) application. The ESI has all the tariff data downloaded via the WAN and is able to calculate account balances and run the prepay processes. The meters only measure and store data and therefore do not require firmware updates to modify their functionality and therefore remain simple, updates can be sent to the communications hub if required over the WAN. Data is never lost as it can always be retrieved from the meters and account calculations performed again if necessary.

In order to support prepay, ZigBee V1.1 would need some minor additions:

- Volume/Energy cut off value command (ESI to Meter)
- Cut off delay command to cater for friendly credit (ESI to Meter)
- Emergency time out command to cater for comms failure (ESI to Meter)
- Credit Exhausted/imminent supply cut off command (Meter to ESI)

By taking the simple approach to the architecture, the system can be realised in a shorter time, interoperability will be achievable, security will be improved, the cost will be reduced and the system will be future proof without the need for firmware upgrades to meters. ZigBee SE V1.1 already meets most of the requirements, the work will then be limited to upgrading DLMS at the WAN level.

Examples of the system as proposed already exist elsewhere in the world based on ZigBee SE V1.0 and are working to provide smart grid functionality.