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Q1: Should the HAN hardware be exchangeable without the need to exchange the meter?

The HAN hardware should not be exchangeable without replacing the meters. To achieve this, a typical smart metering installation would require a separable HAN module for the telecommunications hub, electricity meter, gas meter, and IHD. To modularise a small component (often only a chip) would drive additional cost (extra fittings, flaps, and other materials) into the meter set, with no benefit. The data link to the module would introduce a security risk, giving rise to a hardware interface that would be difficult to protect. The only advantage of an exchangeable HAN communications would be to de-risk an early smart meter design.

The required architecture allows for additional devices (micro-generation device, heating controllers, auxiliary switches etc.) that would also need to have modular HAN Chips. Given that HAN chips can have their firmware upgraded, it is not necessary to be able to replace these chips in situ. Once a HAN protocol (e.g. Zigbee) is selected, this will be the HAN technology for the duration of the meter/communications hub installation.

Q2: Are suitable HAN technologies available that meet the functional requirements?

There are currently no HAN technologies that can provide all the functional requirements; however, there are technologies that meet most, and that can be extended to meet all requirements except the five second refresh rate, i.e. Zigbee Smart Energy Profile + Extensions. Due to the unique nature of the UK market, there is no HAN choice that will meet all desired requirements, so the options must be evaluated on their practicality, fit and development path.

British Gas, with our technology partners, carried out an evaluation of the HAN options when developing our published specification for smart metering. We believe that Zigbee is the correct technology choice for the HAN but, in order to achieve technical interoperability between vendors of smart metering

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components, the scope of the technical specification will need to include a catalogue of Zigbee extensions.

Zigbee can support all the Ofgem HAN requirements except the five second refresh rate (this is seven and a half seconds). Seven and an half second refreshes allow the network to continue to operate effectively when loaded with multiple devices wanting to talk to each other.

While some on-site situations may require a variant to the standard smart metering arrangement (e.g. blocks of flats), in our view Zigbee is the most suitable candidate technology for HAN use, for the following reasons:

- Zigbee is an open Standard
- It has low power consumption
- It has good security
- It supports nearly all the OFGEM smart metering requirements
- It is a standard that is ready to be used now.
- It is being deployed in very large numbers across the world

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Q3: How can the costs of switching between different mobile networks be minimised particularly in relation to the use of SIM cards and avoiding the need change out SIMs?

Our response to this question assumes that in a change of supplier scenario both suppliers are using the same DLMS COSEM protocol commands over GPRS, but have different mobile network SIMs that are set up on a roaming profile.

In the case where both fuels change supplier, the incoming supplier could either conduct a site visit to exchange the communications hub/SIM card – not a preferred approach – or transfer the contract for the SIM, allowing the SIM to stay with the meter. The latter choice would require the incoming supplier to have a commercial relationship with the adopted SIMs operator, and to allow roaming to another provider. The data connection/interface between the two

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network operators' systems should be compatible. The GPRS modem is not expected to require a firmware upgrade, but the incoming supplier could achieve this if required. It is expected that the SIM stays with the communications hub on change of supplier.

If only one fuel changes supplier, the commercial relationships become rather more complex. The incoming supplier would require an agreement with the current SIM operator in order to be able to connect. This assumes that the communications hub can interact with two head end systems with no data transfer conflict. In this scenario, which we are not convinced is workable, we suggest that the electricity supplier would gain control and responsibility for the communications hub so that maintenance responsibilities can be allocated.

An alternative approach would be to use a third party 'data agent' to provide supplier-neutral interim DCC services, to intercept and divide data streams from each fuel and ensure that only the correct supplier has visibility of metering data. This approach has merit and is described more fully in our comments on interim (pre-DCC) interoperability under Q4 of the consultation on Implementation Strategy.

SIM cards are not the most reliable and secure way to achieve communications, and British Gas shall be using Chip SIMs in stand alone communications hubs.

Q4: Do you believe that the Catalogue is complete and at the required level of detail to develop the technical specification?

We have provided a more detailed response to the content of the catalogue to the first SMDG Technical Assessment Sub Group, in which thirteen substantive changes to the requirements were noted and eight substantive changes to services.

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We suggest that the following should be added to the Catalogue:

- Clock accuracy
- Communications protocols and physical carriers (GPRS/GSM, TCP/IP, DLMS COSEM, and 2.4GHz, Zigbee SEP)
- HAN technology so that protocols can be documented and agreed.
- Design life of the system.
- Safety requirements (including the customer intervention to restore supply following interruption).
- Tariff requirements need further specifying before a technical specification can be drawn up
- Synchronisation of data with back-end systems (e.g. prepayment values and calorific values)
- Security models, strategies, and connections.
- Configurable items – what can be done by the consumer and what is supplier-only controlled
- Quantifiable data e.g. “prepayment data for 3 months” is not suitable, where as “10 last prepay credits” could cover 3 months or 2 weeks
- Tariff data, structures, detailed displays

Q5: Do you agree that the additional functionalities beyond the high-level list of functional requirements are justified on a cost benefit basis?

We are not persuaded that there is cost-benefit justification for all the additional functionalities. Specifically:

- Last gasp alert – we believe that same outcome can be achieved by actively polling meter points without the requirement for batteries and capacitors that degrade and require maintenance. Last gasp alert is no longer an ENA requirement. The addition of a last gasp message adds cost per meter set in the form of either a battery or super cap that will require maintenance and/or replacement prior to the end of design life

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- Erasure of consumption data – all Time of Use registers and half hourly values should not be removable, as these are required for billing purposes and are linked to metrological-controlled registers.
- System support measurement of other power quality data including voltage, frequency and sag and swell information, harmonic distortion – we agree with the inclusion of reactive measurement, voltage quality, and frequency, but are unsure on the justification for sag/swell and harmonic measurement. It is our view that these are no longer ENA requirements as the benefits case is unproven.
- Gas meter to measure peak demand for network planning – there is a safety issue here if Networks model pressures based on dynamic Maximum Demand. We do not need to see a cost benefit here, but a safety case for doing so.
- WAN able to be physically switched off – we are unclear why this is required. The same effect can be achieved by disabling the SIM.
- Fifteen year battery life for gas meter – the British Gas specification requires a twenty year life for the gas meter, with a battery change after ten years. We think a battery life of fifteen years is harder to deliver and could prompt meter replacement five years earlier than is necessary. One battery replacement within a twenty year meter life is the real requirement and stipulating that this should be after fifteen years will increase costs for no significant benefit.
- The HAN interface shall support real-time two way communication from mains powered nodes (5 seconds delay/update) – while five seconds is an aspiration, due to network capacity issues (given multiple devices in addition to the metering set) 7.5 seconds ensures network integrity when all devices are attempting to communicate.
- The WAN shall be capable of being physically switched on and off by authorised personnel – there is no need to be able to turn the WAN on or off. Such a facility would be open to interference by non-authorised parties and an alternative, not requiring a site visit would be simply to disable the SIM.

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Q6: Is there additional or new evidence that should cause those functional requirements that have been included or omitted to be further considered?

Please see answers to Q4 and Q5 above.

Q7: Do you agree that the proposed approach to developing technical specifications will deliver the necessary technical certainty and interoperability?

Yes, we are confident that the approach will be successful if the scope of design includes a selection of communications protocols and security models. Decisions will need to be made to enable designs to be drawn around robust installation, change of supplier, prepayment, and firmware upgrade processes.

Q8: Do you agree it is necessary for the programme to facilitate and provide leadership through the specification development process? Is there a need for an obligation on suppliers to co-operate with this process?

Yes, we think it important and helpful for Ofgem to lead the specification development process to prevent any form of delay. We are fully supportive of the Government's ambition to accelerate the smart meter deployment and would not wish to see the Programme getting bogged down in avoidable technical discussions over the specification. We are conscious that British Gas has made more progress towards mobilisation than some of our competitors and would look to Ofgem to ensure that no avoidable delays are introduced into the process for delivering the specification.

British Gas is fully committed to supporting the design specification programme and believes that the detailed work we have undertaken on our published specification over the last two years is a valuable contribution for the industry. It has advanced the thinking from the SRSM functional specification and should provide opportunity to shorten the delivery time for the final industry specification. This will not happen if Ofgem allows

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stakeholders to attempt to wind the clock back with irrelevant technical red herrings and definition queries. We recognise that some suppliers may be less keen to see progress and so have no objection to an obligation being placed on suppliers to co-operate.

Q9: Are there any particular technical issues (e.g. associated with the HAN) that could add delay to the timescales?

British Gas anticipates that there will be technical issues in the following areas:

- Security – local and communications
- Firmware upgrades process – roll back and time duration
- Agreement of physical communications layers – GPRS and 2.4GHz
- HAN protocol will need agreement, and then extensions catalogued.
- Change of supplier process and data transfers
- Safety
- Exceptions – fault scenarios, communications issues, message retry strategies
- Installation requirements and tools – for example British Gas operatives use a Hand Held Terminal to install smart meters
- Prepayment processes (meter/vend codes to be established)

Q10: Are there steps that could be taken which would enable the functional requirements and technical specifications to be agreed more quickly than the plan currently assumes?

British Gas has invested heavily in this area, and we feel we have done an enormous amount of design work to contribute towards the development of the UK smart metering market. We believe there is nothing unique or unusual about our requirements which would make them different from any other supplier's. The smart meter specification published earlier this year was designed to align with industry requirements by following the high level requirements in the DECC consultation and the collaborative work undertaken

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by all suppliers over the last three years, under the auspices of the Energy Retail Association. British Gas advanced the process by taking these common requirements to a level of detail that enabled the design and manufacture of smart meters to progress, using open standards.

The level of agreement on the basics should not be underestimated. The British Gas product specification can be used as a basis to work from, as this has been strongly endorsed by the ENA, and has been accepted by several large meter manufacturers. The adoption of this specification as a starting point for the development of a specification for the industry could allow consensus to be reached in a faster timescale than would otherwise be possible. There are, of course, vested commercial interests at play that may not be satisfied by certain aspects of what has been published; this is something that could be leveled at most stakeholders, British Gas included.

We have no wish to stifle debate or assert that our specification is perfect and that any deviation from it is wrong. What we want is clear, reasoned and rapid decision-making that can make 2020 achievable. Ofgem must use the specification as a resource to help deliver that outcome.

We do believe that the initial sub group meetings could have been more focused and would have benefited from more active chairmanship. Whilst we appreciate the benefits of a facilitatory approach, there is a need to prevent debate meandering and to restrict the impact that personal agendas can have on progress. We encourage Ofgem to take a more active role in chairing these sub groups, consistent with that used in the overarching workstream meetings.