TAHI INTEROPERABLE APPLICATIONS FOR THE SMART HOME

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Response by The Application Home Initiative (TAHI) to the DECC Consultation on Smart Metering.

Dear Phil,

TAHI is pleased to respond on behalf of its membership while noting that because of the constitution of its membership it can only put forward generic views in response to the questions raised by the Consultation. TAHI cannot take a sector related "view" but must work from the premise of what it deems good for the UK is also likely to be good for its membership.

TAHI has as its mission "to accelerate the adoption of products and services by connected home based users". Therefore, its perspective on Smart Metering is aligned with its mission and that the efficient supply of energy to home based users is one of the services that will grow this market as well as providing a new market for those of its members that manufacture products that will be used for or support smart metering.

TAHI also has members who represent the consumer and especially the fuel poor consumer and this also colours its responses to the Consultation. As well as energy efficiency, TAHI covers all kinds of home systems and has members highly involved in assisted living (healthcare and telecare) and notes there are specific concerns at the interface of healthcare and energy efficiency. TAHI is concerned that whatever solution is arrived at by the government following the responses of this Consultation that instruments put in place for smart metering and energy efficiency enhance the delivery of health and telecare to people as they age.

We note that the communications network that will be established to support electricity and gas metering provides connectivity that could support additional "value-added services" such as health and telecare. We also note that there is no explicit recognition in the consultation document of the value of value-added services to householders, business and society. We urge DECC to ensure that policy and regulatory decisions are made that facilitate the use of the smart meter system to encourage innovative services beyond electricity and gas metering functionality.

We also note that it is proposed that the CCP has ownership of the WAN device and Real Time Display (RTD) in the home. We are concerned that this will increase the potential issues of interoperability with other in-home devices and services and introduce a monopoly supplier where there is not a case for doing so. Rather it is our recommendation that the proposal could be improved and the work of the CCP simplified by requiring them to solely specify a universal communications port to be fitted to all meters. This would encompass defining the physical, power and data format of such a port[1]. This then would enable the flexibility needed for the growth in

[1] to commonly used IT standards port specifications

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function of In Home Displays (IHDs) and integration with other in home devices that in turn will enhance the benefits to be derived from the smart meter programme.

It is important that interoperability is achieved between various users of the network, the systems, products and applications. An important key decision is not to define specific protocols or interfaces to ensure innovation, but create a mindset that interoperability is ensured through software, i.e. webservices. This guaranties a future proof environment for the UK with capabilities for all kinds of services. Focus should be on quality of service, access control and security and this should be achieved through service level requirements (SLRs).

From its position of overlooking all the services supplied to people at home, TAHI recommends that solutions consider the market holistically in order to accommodate technological advance and optimising benefits.

TAHI expects the proportion of “intelligent” devices in the premises (home and commercial) to increase exponentially because most electrical devices, from low energy lighting to complex audio visual devices will have embedded microprocessors. It is a clear trend that, during the next few years, any microprocessor will have the ability to communicate and can therefore be controlled by systems external to it.

TAHI expects the market for “intelligent” systems in the home to grow rapidly and most equipment within the home to be networked, i.e. participating in distributed applications managed cooperatively by the home owner and third-party service providers, by 2020. Thus as the energy supply industry tackles renewable energy and subscribes to the smart grid vision, the scenario of measuring and managing every device or entity from the “electric kettle to the nuclear power plant” together with all the energy flows in between, will finally be realised.

By the same token, the delivery of assisted living, home control and energy management to keep people in a comfortable environment and in safety and security, will also become a major element in an increasing number of homes, perhaps reaching 90% by 2020. These services and applications will cooperate in the future home and need to avoid the potential conflict between the desire to save energy generally versus the needs of the fuel poor.

It also is noted that the communication requirements of the energy industry in smart metering and the assisted living sector are somewhat similar. They both require highly secure, high reliability communication with a high integrity of data, and are revenue and supply critical for energy and life critical for assisted living and both have privacy and data protection issues that will need to be addressed thoroughly before either can be deployed. The requirement for a high data rate as found in the audio visual or IT sectors is quite different although such communication paths could with proper safeguards and, with agreed service levels, support smart metering. Besides data rate, future services and applications may require frequencies of communication ranging from occasional but set time periods to an “always on” state which would impact on the preferred communication infrastructure. We believe the infrastructure being put in place should support various services, starting with energy management related services as the prime goal, but be able to expand in other areas where this same infrastructure could be used.

TAHI is already looking forward to when such systems will be commonplace and has determined that interoperability of systems, devices and networks will be fundamental in the home space and for the essential services to be delivered to it. Accordingly, TAHI, using its own resources and funded by its members has developed an Interoperability Framework Requirements Specification (IFRS) which is a first step towards general interoperability. The IFRS will not define new protocols or interfaces but build on existing international standards.

We are taking the IFRS forward into standardisation under a CENELEC Workshop Agreement which is scheduled to complete by the end of 2009. TAHI believes that the requirements set out in the IFRS will ensure interoperability for all services to the home including smart metering provided they are complied with. TAHI is also active in UK standardisation through BSI and is represented on the BSI SMG/1 mirror group for the EU SM-CG (for Mandate 441) and with European Standardisation for the SmartHouse.

TAHI covers and understands services for the whole SmartHouse and believes that any solution that has not taken the whole of the market into account is likely to be sub-optimal and, without considering the cost benefit likely to be derived from supporting synergistic services, over costly.

Yours sincerely

Stephen Pattenden

TAHI Secretariat – For TAHI Membership

The TAHI Response to the DECC Consultation on Smart Metering

TAHI responds to a subset of the questions asked by the Consultation as follows:

Q1. Do you have any comments on the Government's preference for the Central Communications model?

Economic solutions and models are important; they are necessary but not sufficient. For example, regardless of the communications model, the service level requirements (SLRs) and the necessary information exchanged over them, which implies a data model, must be mandated at a level that allows for competition and the provision of differentiated services, regardless of the communication system that transports the data between end-points. The model must ensure that end-points are sufficiently open to encourage innovation and competition for access to them. Furthermore, the communications requirements must be future proof in that they will be able to accept interoperable new technology that will deliver better, more cost-effective communication and accommodate the addition of new services as the smart grid concept matures. In other words, what must be mandated is an information model that states what must, should and may be provided and the service level agreements (SLAs) that can deliver it under the requirements for Smart Metering,

TAHI recognises that the "Central" Communications Model may deliver the above necessary communication requirements most economically but not necessarily effectively. However, to fulfil the requirements it may be necessary to apply foresight to the potential risks of setting the SLRs too low.

Furthermore the Central Communications Model (CCM) (as with the other models analysed) is potentially a very inefficient model and therefore contrary to the aims and objectives of the wider low carbon objectives. It is also somewhat in isolation from Digital Britain. It is also anti-competitive. This is the justification for these comments:

1) The very act of establishing a CC infrastructure will itself require energy and therefore carbon to design build and operate. A systemic appreciation of carbon is essential to its reduction. Therefore an infrastructure built to satisfy the needs of a single market sector (albeit an important one) is insular and hence not systemic.
2) Digital Britain already calls for the national availability of broadband to every UK home. Establishing a parallel infrastructure for an insular application ignores Digital Britain. There is ample security expertise in the UK to ensure that secure, ring-fenced data provision for smart metering may be made within existing broadband technologies.
3) Broadband-based data channels are an established, open market with low cost of entry and supported by many media and channels. GPRS-based channels are by comparison, closed and with a very high (if not prohibitive) cost of entry. To suggest that there is competition in that market based on present players is to suggest that for the next few decades, on these players, or those who wish to invest billions of pounds in new infrastructure are the only ones who could participate in the market.
4) The use of broadband as the primary channel would permit smart meters with GPRS to use their GPRS for only emergency use and therefore avoid a substantial investment in a parallel smart metering network – the existing GPRS network would be more than adequate for occasional, 'emergency' use. A given meter would only use the wireless network when the broadband failed.
5) Moreover, clause *4.5.2.1 Technology choice impacted by premature communications stranding / installed* recognizes the risk of obsolescence.
   The use of IPv6 over broadband as the primary network ensures the smart meter network will be supported and benefit by market developments over the coming decades. Whatever

HAN is used to connect the meter to the 'digital consumer unit'[2] will automatically ensure its presence in the market for many decades.

The above indicates that the communication paths from the premises for energy management may not be exclusive to the smart metering communication path: other paths could be used such as commodity broadband or PLC. There is no reason that the smart metering communication path should not use broadband (eg ADSL, cable or fibre) or any other communication path provided the SLRs are complied with which implies that the SLRs are more important than the method of communication and that all relevant communication paths or methods will need to be employed. This is particularly important given a future smart grids dimension.

Selection of both WAN and HAN communication paths and methods should be pragmatic and subject to a standard trial, analysis and selection processes. It is expected that these may already be in place in the premises and there will need to be sharing of resources. In such cases, it may be more cost effective to use simple communication modules (attached to a universal communications port in the meter) to utilise existing resources than to impose a new HAN or WAN infrastructure owned by the CCP.

Whichever model is chosen, there will be a requirement for fully secure end to end information flows between the meter and the energy supplier for any particular consumer and this will add complexity to any model since regardless of where the consumer is geographically, each supplier will have different information requirements if their service is to be differentiated and competitive. Each consumer may contract with any of the energy suppliers and data requirements will depend on consumer circumstances and services contracted. The communications provider should simply manage this data flow and be prepared to accept there may be far higher data flows in future and use appropriate technology to manage them.

Moreover, the end-to-end notion inherently excludes the benefits of hybrid services in which new business models, based on net carbon as well as energy may be rolled-out and which may well improve the business case.

Q2 Do you have any comments on the analysis and conclusions on the delivery model contained in this consultation document, the reports prepared by Baringa Partners, or the Consultation Impact Assessment?

Having reviewed the delivery models we question the basis for the assumptions eg. the choice of GPRS as the communication method, or two display devices in any one home. For example, does GPRS have sufficient coverage to support delivery of smart metering objectives, is it a future proof technology and is it economic for the continuous connectivity that could be required in future? Digital Britain is becoming a reality and will clearly impact the delivery solution.

Q3 Do you agree the Central Communications model effectively facilitates 'end to end' management of the electricity networks system needed for smart grids?

Only partially *(TAHI Members were divided on this)*: it facilitates management of the electricity networks system only as far as the smart meter. A major part of the smart grid concept is to understand and manage the use of individual devices within the premises (domestic or commercial) and the distribution network accumulating and processing information from all points of the grid and for the generation plant feeding into it in real time. It is highly unlikely that all the networks and devices attached to them within the premises or across the grid will come under the control solely of

[2] A digital consumer unit (DCU) is a concept for managing all the home systems and their connectivity to the WAN in a suitable place in the home – very much as an electricity supply consumer unit does for electricity distribution in the house. If there is a link between the DCU and the meter and also to a IHD then this will enable any required IHD

any of the entities involved in the delivery of any of the communications models, yet it is within the premises, and by managing supply and generation, that a major proportion of energy savings will be obtained through the smart grid. In the premises these may be: through control of devices such as refrigerators and deep freezes; the action on lights and lighting systems to reduce 10% of the lighting load; making the start up of white goods such as washing machines conditional on overriding a cost warning when energy is scarce or expensive; or managing the premises so that heating of empty rooms or the whole premises when empty is reduced. It can easily be understood that there are many candidate communication systems to reach different types of equipment: these are not in any way mutually exclusive; further the devices and objects connected may have many differing requirements for communication especially in regard to the smart grid requirements for always on and real time information.

Q7 Do you agree with the functionality proposed for electricity meters? Please explain your reasons and if possible give evidence for your comments.

The Question refers to electricity meters. Our answer applies to all MID-compliant meters, There is a major risk in mandating requirements based largely on existing AMR practice. What is possible now in delivering information into the premises to displays and devices must take account of future evolution that may place very different demands on the system.

It is necessary to differentiate between the part of the smart meter that falls under the MID and the other functions of the smart meter that do not. MID imposes certain requirements that may be enhanced by such functions and does not constrain them.

The non-MID part of the smart meter should be highly flexible and able to take account of future situations. We do not know how energy will be charged for in the future and time of use tariffs may well become obsolete in response to a more uncertain energy supply. eg. through renewable and short term generation shortages. One technology option is for the non-MID part to be based on a robust embedded system that could be programmed and reprogrammed to carry out many different roles. It could emulate multiple registers and respond to price and other messages to manage load and local generation.

There may need to be a secure “firewall” between the MID part and other functionality of the smart meter.

TAHI believes that a smart meter of this type could be made highly reliable in terms of its measurement capability and also reliable and highly flexible in its functionality at a reasonable price point. Allowing this would provide a powerful opportunity for manufacturers and all the stakeholders in the Energy Supply chain

Specifically with respect to the Table under section 3.3

A – TAHI agrees

B – TAHI agrees in general but does not see a need for “transfer data at defined periods”. Surely, it will be the remit of the users (suppliers, retailers, distribution and others) to determine when information flows – this should be an “always on” requirement.

C – Yes, but there are already a number of potential standards, some may already be in use for other tasks on the premises. There is an issue of interoperability and ownership of the network and networks in the home.

D – At least one register must be located under the MID part of the meter. However, The requirement for multiple time of use registers could be a non-MID function (provided the base data is held by the MID part). If the non-MID part is flexible then this can be provided as circumstances require.

E – TAHI agrees but as technology advances all electrical devices, sophisticated or not, may be controllable

F – TAHI agrees but has concerns for the safeguards for people under assisted living and the fuel poor.

G – TAHI agrees

H – TAHI agrees but notes that in terms of load management a microgenerator is simply a negative load device. (In terms of tariffing however, a need for an "export register" is foreseen and necessary to collect the generation output of such devices where affirmative renewable generation tariffs are applied).

It is noted that many of the same considerations are being taken into account under the EU Commission Mandate 441 and the Smart Metering Coordination Group and the standards bodies are already working in this area. It may be important for the UK to ensure its solutions in this area match those that emerge from the mandate. It is recognised that the EU standards may be some years away and we need to progress quickly in UK.

Q8 Are there any additional requirements that will be needed to facilitate smarter network management, efficient energy management and the development of 'smart grids'? Please provide analysis, particularly on costs and benefits, where possible.

It all depends on how the smart meter is specified. The simpler the MID part can be specified and the more flexible the non-MID part is made, the more likely it is that any smart meter can accommodate future changes required by the smart grid. The current functionality does not take into account aspects of grid management.

TAHI considers that security of communications, especially for the wide area network should be regarded as an important consideration. Authentication of the party connected to the meter and encryption of the data exchange will be important as the meter readings are effectively a monetary transaction. With remote disconnect being possible the smart meter network needs to be secure against possible malicious attack, therefore also the choice of WAN communications technology should be considered carefully to ensure the lesser risk of such an attack.

Q12 Do you agree with the Government's position that a standalone display should be provided with a smart meter?

Providing the consumer with information remote from the meter itself is an important element of the smart metering programme and the most valuable part for consumers. TAHI is in agreement that information provided by the smart meter shall be displayed in real time. However, TAHI does NOT consider that there should be a "one size fits all" Real Time Display (RTD) supplied with <u>every</u> smart meter.

It is noted that there are already systems that can provide the necessary information via an IHD, TV, PC or mobile phone, sometimes with additional intelligent input. With the Digital Britain campaign aiming to provide broadband to all the population largely before the start of the smart metering roll out it is possible there are other options that may cost the energy industry less and provide the same or better results. TAHI considers that these modes of display are likely to be effective in delivering information to consumers. It is therefore vital that the programme does not limit these options whilst providing the necessary stimulus to engage consumers and deliver the benefits and carbon reductions that underpin the business.

The programme also needs to consider the wide range of homes in Britain. In particular, pre-payment customers, the rented and social housing sectors are less likely to have the range of sophisticated displays currently needed to interface with smart meters. In these cases a standard

standalone basic functionality RTD, purpose built for local use, is expected to perform an important function in engaging users.

However, if a basic RTD is provided centrally together with the smart meter and was unable to link with other systems in the home, utilities would be disadvantaged when supplying different types of IHD for their customers, displays that could be innovative in terms of capturing the attention of the consumer, and integrating with other home automation and monitoring systems. We recommend therefore that the CCP has non-exclusive access to IHDs/RTDs, whatever form they may take in order that such innovation will be encouraged.

To support this recommendation, and consistent with our answer to Q1, we urge the government to specify the information that must be provided and displayed, to mandate mechanisms that ensure it is interoperable with the metering system, and specify minimum information display functionality. Using this platform, then let the utilities and service providers make decisions about other functionality, presentation of information and indeed whether the display is a stand alone display, or a logical connection to a TV or PC or mobile phone (for instance).

Lastly as a final argument against mandating the display device rather than the information to be displayed, TAHI has concerns over the life cycle costs and lifetime of a standalone display given that it would have to match the lifetime of the meter. There is also a concern that should a mandated display fail or become damaged in any way, as to where the responsibility for its replacement will lie.

Q13 Do you have any comments on what sort of data should be provided to consumers as a minimum to help them best act to save energy (e.g. information on energy use, money, CO2 etc)?

There are many obvious pieces of information that would need to be presented such as meter reading, the current cost of energy, or the current load. The display must be interesting and be able to display all kinds of local and useful information (e.g. the weather, times of local busses, traffic info, energy saving hints, or news flashes) to encourage users to use it. TAHI has doubts whether the display of a simple meter reading with costs is sufficient to retain consumer interest and hence savings in energy use (and many trials and studies have confirmed this). The recommendations in our answers to Q1 and Q12 provide for connectivity and information exchange that enable such innovation.

For example, for energy management, it could report empty rooms being heated, or rooms being heated with windows open, and direct the consumer to reduce waste. To do this, such indications would require a whole house network utilising many sources of data input and this falls into the area of what will be needed when smart grids become widespread and will require whole house interoperability

These considerations have implications about the SLRs to be set for communication.

Q22 Has Government identified the right issues for the immediate next steps? Are the other activities or key issues which you think should be addressed at this stage of the preparations for roll out?

TAHI supports the UK 3.0 initiative and its ambitions in this objective.

We note that the communications network that will be established to support electricity and gas metering provides pathways and nodes, of which smart meters are an example, with computational capability that could be used to support additional “value-added services” such as health and telecare. We also note that there is no explicit recognition in the consultation document of the value of value-added services to householders, business and society. We urge DECC to ensure that policy and regulatory decisions are made that facilitate the use of the smart meter system to encourage innovative services beyond electricity and gas metering functionality.

Roll out models can have significant impact on the preferred, or most cost effective, WAN communication model. “Community” thinking and the support for human communication can impact the acceptance significantly. The ability to support other services, from energy management to assisted living could also ensure a positive adoption.

We would encourage DECC to commission a study of the economics of such value-added services and other gaps in benefit quantification; it is possible that this could significantly improve the economic case for the smart meter programme.

Q23 Do you have any other comments or evidence on issues relating to this consultation document or the accompanying Consultation Impact Assessments?

EU Mandate 441

This consultation must result in actions that are aligned with the outcome of EU Mandate 441.

Universal Communications Port on the Smart Meter.

The ability to provide the future proofing necessary to be able to integrate metering information with systems provided by a range of service providers throughout the life of the meter is very important. The Universal Communications Port is a well-developed widely deployed industry-led architecture, compliant with International Standards, that provides for secure connectivity and information interchange between devices interconnected by a variety of media and integrated with ICT systems. The provision of such a port on every meter is a simple, low cost means of facilitating interoperability with other displays and home information systems as these evolve over the life of the meter.

Perceived inaccurate arguments in the Cost Benefit Analysis

There are a variety of systemic defects in the present proposals that all arise from taking smart metering and the data services arising there from as being a closed market. Amongst the topics in support of this position are:

- The clause: *4.2.2.3 Insufficient manufacturing capacity to meet demand / Simultaneous deployments drive shortage in supply* reflects the market position of existing EU vendors. The asserted risk of lack of capacity is invalid. By comparison, Apple Corp. shipped 18 million iPhones in under two years via Far Eastern manufacturers. Licensing designs (possibly a national “Smart Meter Reference Design”) would enable the entire installation quantity to be shipped in two years, if desired. More importantly, the focus has been on the meters, rather than establishing a national standard for the meter data and its authenticity. There is a vast array of vendors, far beyond those involved in the original drafting of the DECC documents. Publishing a standard (including security and authenticity requirements) would enable the open market to satisfy the needs. This is akin to the transformation that took place in the telecomms sector twenty years ago. i.e. some degree of market deregulation in favour of competition, but still within tightly regulated performance requirements.

- This would also beneficially impact on *4.2.2.4 Supply chain not sufficient to meet demand*. The assertion in this clause arises out of a ‘silo-like’ consideration of the problem. There is already a substantial, nationwide supply chain of electrical trade wholesalers and retailers that is more than capable of managing the end-point of the supply chain.

- Item *4.2.4 Risk Assessment* concludes that contractual management is a strong form of cost containment. This is patently only part of the picture. Such contractual issues only arise if a centralized, centrally funded roll-out is undertaken. Widening the market by way of a published standard rather than mandating the purchase of specific meters allows genuine market competition to determine price, rather than contractual prices. If the contracts are under-priced, any legal action arising from non-performance will only drive the relevant parties out of business. From all other centrally-purchased IT infrastructures of recent times, it is clear that depending on contractual arrangements is only of value if legal remedy for compensation will be pursued, which it invariably is.

Future Trends

TAHI considers that the environment in the home and commercial premises will change significantly during the period between the start and completion of the smart metering roll out period and care should be taken to avoid making decisions now that become hostages to fortune by 2020. The overall trend, as ICT elements and systems increase in capability, openness and connectivity is for applications and services to become virtualized, meaning that the logical structure of a system from the user's point of view is unrelated to its physical structure and distribution, and use of real resources. Virtualisation is an enabler for secure private personalized ICT services, for autonomous self-organising systems, for sharing resources and networking information rather than devices, and for building communities; it is well understood at a technical level, although its potential is not yet fully exploited. It is a foundation of the following three key areas:

Future Internet

The Future Internet (The Internet of Services, the Internet of Things and other advances) will bring to the home a far greater number of "intelligent" devices, sensors and actuators that will provide information on their activities and, in the context of this consultation, their energy use or the environment in the home. It is certain we will need to use the information from these devices and will want be able to control energy using devices in order to manage load and consumption of energy. Our answers to Q1 and Q12 state our view on openness of end-points that enables this. We assume that the end-to-end connectivity will be based on a Future Internet model: solutions for smart metering and related services must allow evolutions and adaptations that can be integrated with such a model. Integrity of the supply chain is crucial, and we will need interoperability end-to-end across the chain in order to access the required information and provide the necessary control.

Web Services

Web Services (so-called Web 2.0, for information networking between people and businesses and Web 3.0, the semantic web that builds persistent knowledge and intelligence into a personalized environment), are changing the way in which service providers (and people) will be able to create new services and applications for many reasons including energy efficiency, energy management and smart metering. The essence of these services is that they are open to all providers and their innovations, and available to all users, with the choice of the former made by the latter. They also evolve and improve on short timescales and solutions specified for the present will most likely be superseded in the near future. Referring again to our answers to Q1 and Q12, it is openness and connectivity of end-points that will ensure future-proofing.

Cloud Computing

Cloud computing is a term used to describe the delivery of applications from distributed computer systems remote from the action of the application. (examples are office suites that reside on the web and are executed as required by the user using remote computation servers acting on local data). This paradigm offers scalability on the enterprise element of the smart metering business. It also offers accessibility to user groups that have no means to process information in their own homes. It will enable the non-MID part of the smart meter to always use the most up to date systems to deliver the most current applications for smart metering, energy management and energy efficiency. For this reason, TAHI recommends that the non-MID part of the meter should be specified to be based on the open generative general purpose computer model with the ability for its software to be upgraded as required. The Universal Communications Port, mentioned above, and open, connected end-points, are key enablers for this solution.

General Comments

TAHI as a whole deals with all the potential services into the home and notes that there will be a large degree of interactivity between services and applications. In terms of impact, this greatly increases the uncertainty of any impact assessment but at the same time provides multiple opportunities for sharing infrastructure to gain information on the energy efficiency of any home. Because of this potential sharing of resources and regardless of which sector or organisation “owns” those resources, the sort of efficiencies and load management, that will be necessary from the domestic sector if the UK enters an energy gap scenario, will result in externalities that will result in very significant cost savings. For instance we may not need as great an investment in generation if we can reliably reduce consumption or shed load by managing multiple devices in the home. Therefore, DECC must be careful to allow the functionality of the smart meter and the capability of the communication path to be sufficient to allow for future opportunities and technology advance.

TAHI 17/07/2009