

Key Considerations for the use of the NBN Infrastructure for Smart Grid Applications

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Introduction

This paper has been produced by the Smart Grid Australia (SGA) NBN Study Team, Intelligent Networking Working Group. SGA is a peak industry body representing major utilities, equipment vendors and professional services organisations in Australia.

The National Broadband Network (NBN) is a generational investment in Australia's communications infrastructure setting out to deploy Fibre-To-The-Premise (FTTP) to around 90% of Australian homes and wireless/satellite access for the balance. In parallel with this, industry and government are looking at ways to improve energy management using smart grids. The intersection of these two initiatives will produce significant synergies and opportunities.

Scope

This paper identifies some of the key considerations for utility companies looking to leverage the NBN infrastructure for smart metering applications, for both end-user premises and non-premises deployments. It also includes some other energy related applications that are considered near-term and are sufficiently understood such as in-home energy displays.

The paper identifies some of the key opportunities and challenges, and points clearly to several areas that would benefit from further study by SGA or NBN Co.

The considerations are grouped as follows:

- ONT Deployment
- Wholesale Service Model
- Home Area Network (HAN) Interconnectivity
- Integrated ONT and Smart Meter

The considerations relate primarily to end-user premises and non-premises locations connected to the NBN FTTP access network. However, they also have relevance for wireless/satellite access networks (and may warrant more commentary in the future).

More advanced HAN solutions, in-home appliance communications and more traditional broadband services such as Internet access are out-of-scope of this paper.

This paper restricts its focus to smart metering (while acknowledging that the NBN infrastructure could also be leveraged for some other near-term and long-term smart grid applications). These are also worthy of future study.

Key Considerations for the use of NBN infrastructure for Smart Grid Applications

ONT Deployment Considerations

In the fibre serving areas of the NBN, optical networking terminals (ONTs) will be deployed at end-user premises and will present the User Network Interface (UNI) of NBN wholesale services. This marks the point where smart metering applications and devices will interface with the NBN and so sharpens the focus on which factors associated with the ONT deployment will be significant for the NBN.

The following are the key considerations that warrant further investigation:

ONT Powering

The choice of electrical power source for the ONT is important as there is a need for Utilities to maintain communication with the smart meter even when the electricity to a premise has been disconnected by the Utility. Maintaining power to the ONT when the premise power has been disconnected may also have relevance to other key services provided over the FTTP, such as telephony.

ONT and Smart Meter Connectivity

The location (internal / external to the premise) and the proximity of the ONT to the smart meter needs to allow appropriate and cost effective connectivity using the suitable technology.

Specific Multi Dwelling Unit (MDU) Considerations

There are a number of differences between multi and single dwelling units including the existing telecommunications infrastructure within the multi-dwelling units (MDU), the location of the ONT or other NBN NTU devices and the location of energy meters.

In addition, business end-user premises exhibit similar configuration issues.

Wholesale Service Model Considerations

Smart metering applications will be affected by the shape of the wholesale service model adopted by the NBN – and specific aspects of the resultant service level agreements offered with NBN services. Careful consideration will be needed if NBN wholesale services are to prove useful and economically viable for utilities. Some of the key considerations are discussed below:

Wholesale Service Model

Utilities are looking to utilise IP technology in their smart grid initiatives to reap the benefits offered in addressing and managing a very large number of devices. These devices, which are likely to number in the

millions nationally, will be essential to making smart grids a reality. By using IP technology, utilities can leverage Layer 2 Ethernet or Layer 3 IP services from telecommunications providers.

There is value in further analysing the advantages and disadvantages of the options. The analysis could consider, for example, the technical and economic viability to utilities of an option such as NBN Co providing purely Layer 2 Ethernet and an intermediary telecommunications provider aggregating NBN Ethernet services and adding Layer 3 IP capabilities.

Non-Premise Coverage

Some utilities have made advances in smart metering deployments using other access technologies such as wireless “last mile”. As a result, there is a clear “use case” for smart metering applications that leverage NBN services to non-premise locations in order to provide connectivity to a suitable gateway device. Understanding the opportunities for leveraging the NBN services could determine the likely non-premise locations, the service attributes required for high numbers of smart meters serviced from a non-premise and consequently the kind of underlying infrastructure that would be required.

Service Level Agreements

The detail of the service level agreements (SLAs) NBN offers will also be important for utilities. The key issues are the kinds of attributes and values for smart metering applications, including aspects such as in-home displays, that will be incorporated in those SLAs.

Home Area Network (HAN) Interconnectivity Considerations

In smart grid terminology, the HAN (Home Area Network) is used to provide collaboration between devices in the home that consume energy and/or interact with the energy provider in order to enhance the efficiency of the overall energy network and optimise usage in the interests of environmental and economic efficiency. The HAN may be separate to other End User Premises (EUP) networks for services such as the internet, or combined with existing EUP networks.

The HAN, although beyond the scope of NBN wholesale services, is important for several reasons. These are described below:

HAN Gateway Options

In order to provide connectivity between the smart meter, energy provider and energy consuming devices within the EUP, a gateway is required to connect the EUP HAN to the smart meter and energy provider.

This could be the smart meter or another specialised device. The HAN gateway would require capabilities beyond that of a standard ONT.

Interfaces to the HAN

There are a number of protocols and interfaces that could provide connectivity into the HAN e.g. Zigbee, HomePlug. Investigation of the provision of these interfaces independently of the integrated ONT and smart meter (described in the following section) is necessary to avoid potential conflicts in the HAN.

Integrated ONT and Smart Meter

On the premise that both NBN and utility smart meters will target 100% connectivity of homes in any specific geographic area, the prospect of deriving synergies through an integrated ONT and smart meter device has been suggested by some Utilities within SGA. Clearly, this is an ambitious goal with numerous ramifications.

Summary and Next Steps

This paper has highlighted the most significant considerations that have been identified as the NBN begins to take shape and as government and industry press ahead with smart grid applications, and smart metering in particular.

It is the timely intersection between these two major initiatives – and the scale of the opportunities they present – that provides an appropriate time for a collaborative effort to investigate the most pressing synergistic opportunities between the NBN roll-out and support for Smart Grid applications. This paper has highlighted a number of specific areas where additional study and analysis is warranted.

The SGA NBN Study Team would develop more detail on scoping this additional work in collaboration, or in an advisory capacity, with NBN Co if they are interested in us working together.