ESB NETWORKS

Quick User Guide

Smart Home Energy Management Systems

NATIONAL NETWORK, LOCAL CONNECTIONS PROGRAMME

DOC-301121-HFY

1   INTRODUCTION

This document provides an overview guidance for customer's looking to install a Home Energy Management System (HEMS) to manage domestic loads and electrical heating systems to participate in Demand Response services.
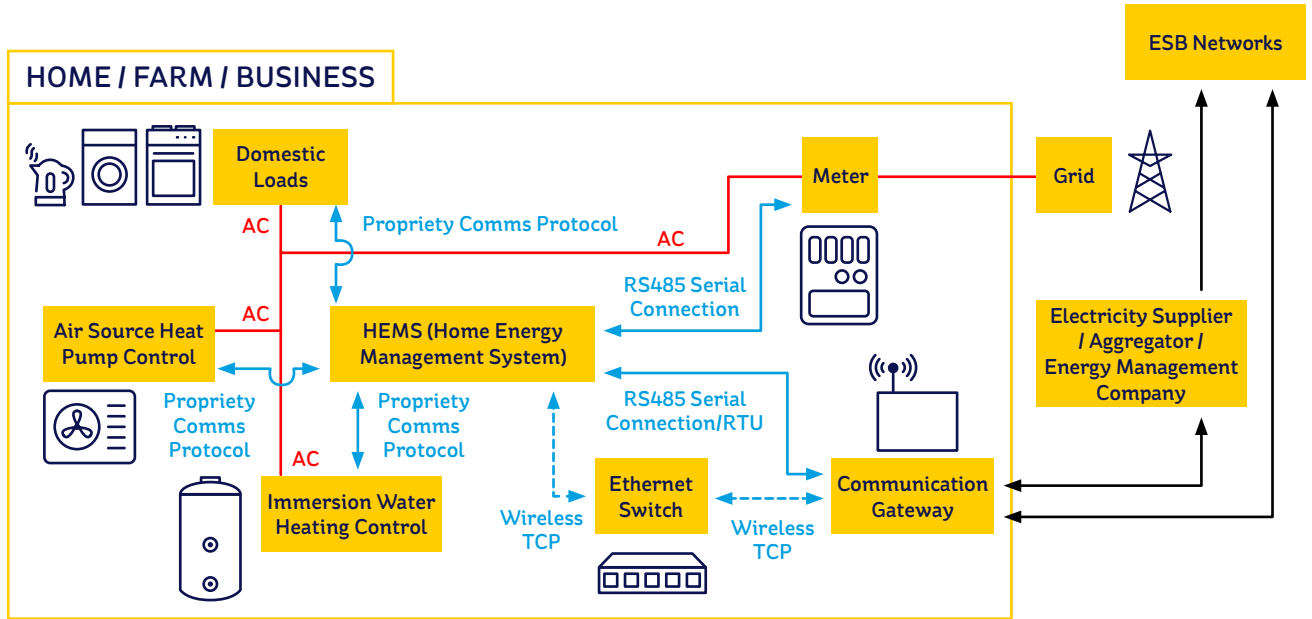
Customers should follow the guidance provided here to ensure they are aligning themselves to the future smart grid architecture that will enable their participation in future flexibility markets and demand response services.

Currently, the communication connections from a home / farm / business Gateway to ESBN is in development – this architecture may not be supported for early adopters but provides the recommend future component level system design.

Similarly, customer's may identify that their current electrical supplier does not provide this technology or services today – this guidance is a recommendation that these suppliers prepare for the future architecture changes and development.

2   OVERVIEW ARCHITECTURE

FIGURE 1 **OVERVIEW ARCHITECTURE**

HOME / FARM / BUSINESS

Domestic Loads

Air Source Heat Pump Control

Immersion Water Heating Control

HEMS (Home Energy Management System)

Ethernet Switch

Communication Gateway

Meter

Grid

ESB Networks

Electricity Supplier / Aggregator / Energy Management Company

AC

Propriety Comms Protocol

Propriety Comms Protocol

Propriety Comms Protocol

RS485 Serial Connection

RS485 Serial Connection/RTU

Wireless TCP

Wireless TCP

3 COMPONENT REQUIREMENTS AND STANDARDS

3.1 HOME ENERGY MANAGEMENT SYSTEM (HEMS) – DEMAND RESPONSE

The HEMS is a smart controller unit at the core of the architecture as shown in Figure 1. It provides the in-home system management functionalities that include logging, monitoring, and control of domestic loads. The smart controller collects real-time electricity consumption data from schedulable and non-schedulable appliances to implement optimal demand management strategies. HEMS communication infrastructure includes networking media and the communication protocols.

Demand Response programs provide the ability to schedule in-home appliances and systems. These appliances can be divided into non-schedulable and schedulable loads. Non-schedulable loads are those that cannot be shifted in response to signals from ESB Networks / Electricity Supplier / Aggregator via the Communication Gateway to the HEMS device. These may be set by users and typically include refrigerators, printers, TVs, microwaves, and computers. Schedulable loads are those that can be switched On and Off by ESB Networks / Electricity Supplier / Aggregator. These include electrical heating systems such as heat pumps, immersion heating and air conditioning systems.

REQUIREMENT	STANDARD
Communication from HEMS to In-Home Loads/Heating-Cooling Systems.	• Meets the requirements of ISO 17800:2017 - which provides the basis for common information exchange between control systems and end use devices found in single – and multi–family homes and commercial premises. • Meets the requirements of ISO/IEC 15067-3 Information Technology – Home Electronic System (HES) Application Model – Part (3) Model of a demand response energy management system. • The Propriety Communication Protocol provided by the HEMS manufacturer to the load control system. This protocol will not be specified by ESB Networks / Electricity Supplier / Aggregator.
Communication from HEMS to Communication Gateway.	• Meet the requirements Modbus TCP and Modbus RTU (RS 485). • Meet the interface requirements of IEEE 2030.5 • Meet the requirements of NIS Cybersecurity Directives. • Meet the requirements of EN 303645

3   COMPONENT REQUIREMENTS AND STANDARDS

3.2   COMMUNICATION GATEWAY

The communication gateway is the in-home hub for ESB Networks / Electricity Supplier / Aggregator to communicate with the HEMS (Home Energy Management System).

REQUIREMENT	STANDARD
Demand Response Signal from ESB Networks / Electricity Supplier / Aggregator	• Schedulable loads to be switched On and Off. • These include – electrical heating systems such as heat pumps, immersion heating and air conditioning systems. • Other Schedulable loads will be considered in future as technologies develop.
Communication Gateway Device to ESB Networks / Electricity Supplier / Aggregator	For Future Connection with ESB Networks and your Supplier or Aggregator: • Meet the requirements of IEEE2030.5/ DNP3/IEC 61850/IEC 104/ IEEE 1815/ SunSpec Modbus • Meet the requirements of NIS Cybersecurity Directives

3.3   AC ELECTRICAL SYSTEM

REQUIREMENT	STANDARD
AC System	• Shall fully comply with I.S. 10101 and be labelled to identify as such. • The AC system shall be tested and certified by a Registered Electrical Contractor and a Safe Electric certificate must be provided.