

**APPENDIX C
PG&E Technical HAN Device Guidelines**

Technical, business and/or functional requirements subject to future updates. All updates to selection criteria will be documented and communicated to vendors through Power Advocate (www.poweradvocate.com).

PG&E will not be acquiring devices. This document is designed to outline possible criteria, and not comprehensive specifications. Also, note that PG&E is not attempting to specify or unduly influence user interface or industrial design decisions for manufacturers, but is willing to provide feedback when desired.

No.	Category	Device Criteria Guideline	Description	PG&E Comments/ Clarifications/ Instructions	RESPONSE: Device Meets Description(s)? Y,N, N/A (if no or N/A, explain)	RESPONSE: Short Answer
1	Product Documentation	Device Labeling	Does the device have a label specifying it has been certified with ZigBee SEP 1.X and includes the MAC address and installation code in human-readable decimal?			
2	Product Documentation	Operational Information	Does the device identify itself by providing the following information to the meter? i. Hardware version ii. Firmware version iii. Serial number			
3	Product Documentation	Operational Information	Does the device display operational information including MAC address, installation code, RF Channels, PAN ID, and Short Address (Internet connected devices can utilize smart device displays for this information)? In addition, is the firmware version, hardware version and model number displayed or clearly identified on the product itself? Optionally, this could also display EPAN and Key.			
4	Product Documentation	Operational Information	Does the device provide on-screen diagnostics with (at minimum) latest error code and time of error?			

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5	Basic Function	Demand and Consumption	<p>Does the device show Instantaneous demand (kW) with less than or equal to 15 sec latency?</p> <p>Consumption (kWh) correctly shown for intervals supported by device. Indicate what intervals are supported by device. This may include:</p> <ul style="list-style-type: none"> - hour - day - past 24 hours - month - billing period - year 			
6	Basic Function	Calculation of Price (\$/kWh)	<p>If the solution provides cost information, does the documentation include a statement that the costs indicated on the device may not match the bill from PG&E, and that PG&E's bill is the authoritative source for billing information?</p>			
7	Basic Function	Disable Feature	<p>Is the user able to disable certain features without disabling other screens/graphs?</p>			
8	Basic Function	Energy Costs (\$)	<p>Does the device show costs (\$)? What intervals are supported by the device? This may include:</p> <ul style="list-style-type: none"> - hour - day - past 24 hours - month - billing period - year 			
9	Basic Function	Burn Rate (\$/hr)	<p>Does the device show \$/hr?</p>			
10	Basic Function	Tier or Time Period Indication	<p>Does the device Indicate which tier (or time period) the customer is in (visual or text indication)?</p>			

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11	Basic Function	Current Meter Register Reading	Does the device display the current meter register reading for the cumulative energy in kWh? Display of cumulative meter register is present for diagnostic purposes - to help assure that the IHD is displaying the same value as the meter. This may be included on a secondary or diagnostic screen.			
12	Basic Function	Text Messages	Can the device send acknowledgements that messages have been received? How many ascii characters can the device display?			
13	Basic Function	Text Message Storage	Can the device store text messages in memory? How many, and for how long?			
14	Basic Function	Text Message Waiting Indicator	Does the device display an indication that a new message has been received? If so, how (e.g. icon or blinking light)?			
15	Basic Function	Association Process Result and Signal Strength Indicator	Does the device display wireless signal strength at all times, and indicate when there has been a loss of connectivity to the HAN? (e.g. text on the display stating no signal, or zero bars in a signal strength icon)	Note that signal strength and network status are different - "associated" refers to the state of the device (associated or disassociated with meter). Signal strength refers to the signal strength being received from the meter (or routing device).		
16	Basic Function	Battery Level Indicator	Does the device display the level of battery charge remaining? If so, how?	This requirement does not refer to devices that are mains powered with a battery backup system. Such systems are not required to have battery status indicators.		

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17	Basic Function	Battery Life	For battery powered devices, what is the estimated battery life under normal and abnormal use cases?			
18	Basic Function	Time of Day	Does the device display the correct time of day (HH:MM) using the correct time zone? The time should be set automatically and synchronized with PG&E meter device (i.e. not user-settable).			
19	Basic Function	Reset Capability	Does the device have the ability to easily be reset to factory default settings by the user? This reset may include erasing all text message, energy, cost and price information on the device and must also leave the network and re-associate the device from the HAN (requiring the device to go through the association process to reconnect to the HAN). How is this reset completed?	PG&E understands a re-association will be necessary upon reset, and please note that this includes gateway devices. Also note that it must be possible (and easy) for the USER to do reset the device not just a technician.		
20	Basic Function	Reset Capability	Does the device have the ability to easily be reset by the user without returning to factory default settings (e.g. maintain data/ settings)? This reset must cause the device to leave the network and re-associate the device from the HAN (requiring the device to go through the association process to reconnect to the HAN). How is this reset completed?	PG&E understands a re-association will be necessary upon reset, and please note that this includes gateway devices. Also note that it must be possible (and easy) for the USER to do reset the device not just a technician.		
21	Basic Function	Reconnect After Power Loss	Does the device reconnect to the home area network without requiring human intervention after the device has lost power (e.g. battery replacement, unplugged from power outlet), the meter has lost power, or any other event causes the device to drop from the network (such as interference)? All device settings history data, text messages, etc. must persist through a power loss or any other loss of network connectivity.			

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22	Basic Function	Operational Distance	Can the device operate conveniently at a distance of at least 75 feet from the meter in unobstructed space?			
23	Basic Function	Power consumption	What is the maximum power consumption of the device over an average 24 hour period?			
24	Basic Function	Status Indicators	Does the device indicate association status with the meter, wifi network and to the network? If so, how?			
25	Basic Function	Radio Frequency (RF) Performance	Does the device comply with the FCC? PG&E requires device compliance with the FCC. Vendor should ensure device meets all federal and state standards and regulations relating to radio frequency emissions. PG&E will evaluate compliance by testing in the following areas: interference, link budget, path loss, sensitivity, RF transmit power, packet error rate.			
26	Installation strategy	Self-Registration	Can the customer self-register the device online via seamless integration with PG&E's Home Area Network web service/API for registration/un-registration of device?			
27	Installation strategy	Device Pairing – Performance	Using PG&E systems (online registration), can customers join their device to their meter in no more than 2 additional steps?	For example, after providing the device MAC address and Installation Code to PG&E systems and after this information is sent to the meter by PG&E, the 2 additional steps may be as follows: step 1 would be the customer powering on the device, and step 2 (if needed) would be the customer pressing a button on the HAN device to initiate joining.		

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28	PG&E Interoperability	Device Pairing with PG&E Meters	Can the device successfully associate with the HAN module in PG&E meters using PG&E device joining systems and methods (SSN's UIQ products) and online registration system? When the device is disassociated from the meter, the relationship is released from the device side in a system reset. The information related to the disassociated device must also be cleared from the meter.	The term de-association refers to removal from trust center, etc. not a device simply being out of range, power outage on meter side, etc. PG&E is enabling web-based registration to simplify the commissioning process.		
29	PG&E Interoperability	Device Pairing with PG&E Meters	Can the device successfully interoperate with the following meter hardware at PG&E? - GE I210+ - L&G A full list of meter hardware is forthcoming in an update to these requirements.			
30	Security	Security	At minimum, is 128-bit encryption present on the computer/LAN side of the gateway?			
31	Security	Secure registration and association of devices	Are messages secured to/ from device and is the data devices contain secure? Devices must employ cryptography, device hardening, and secure the access and control capabilities of the device system.			
32	Security	Security-enforced certificates	Are logs tracking errors and events for history tracking, and internet security controls in place?			
33	Security	PG&E-specific Security Requirements	PG&E-specific Security Requirements to be tested are forthcoming in an update to these requirements.			
34	Security	Penetration Test	Will the vendor give PG&E permission to perform penetration testing? PG&E must be allowed to perform a penetration test against the devices.			
35	Security	Device Hardening	Are steps taken to harden the device? Detailed steps on hardening the device must include at least: - Account management - Keeping unique passwords - Certificate management			

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36	SSN Interoperability	SSN Interoperability	Does the device interoperate with SSN meter FW 2.14 and FW 2.16+?			
37	Standards Compliance & Alignment	State and Federal Legislation and Safety Standards	Does the device must comply with all state and federal requirements, as appropriate? Vendor should ensure that devices meet all federal and state standards applicable to the devices, including but not limited to regulations relating to radio frequency emissions. If applicable, the device must bear an appropriate certification mark as evidence of meeting safety standards consumer products.			
38	Standards Compliance & Alignment	ZigBee Smart Energy 1.X Requirements	Does the HAN device must support all mandatory SE 1.X functionality as well as the following functionality? i. Device must be certified as a ZigBee Smart Energy In-Premises Display device or PCT ii. Device must support the ZigBee SEP 1.0 & 1.1 clusters, attributes, and commands listed in Appendix B.	Note that gateways must provide IHD-type functionality but do not necessarily require a built-in display; rather the gateway proxies the in-home display to a separate display device. PG&E does not intend to provide OTA firmware upgrades to devices through the PG&E AMI network. This does not preclude device manufacturers from adopting other online firmware upgrade methods using OTA functionality.		
39	Standards Compliance & Alignment	Safety	Are safety hazards related to the device documented with the device packaging?			
40	Standards Compliance & Alignment	Registration and Pairing	If the device is a gateway, does the device complete Zigbee Han registration to the meter upon the user connecting to the gateway through the client device (merely turning the device on is not sufficient)?			