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Xcel Energy
Docket No.: E002/M-17-776
Response To: MN Public Utilities Commission Information Request No. 7
Requestor: Hanna Terwilliger, Michelle Rosier, Tricia DeBleeckere
Date Received: December 21, 2017

Question:

Please discuss the decision to use Wi-SUN; including consideration of IEEE 802.15.4g being a superseded standard and the currently active and under consideration IEEE standards related to local and metropolitan area mesh networks.

Response:

Our proposed FAN, comprised of WiMAX and Wi-SUN components, is consistent with developments within the electric utility industry, and current industry standards that have been adopted by vendors, organizations, and other electric utility companies. We actively participate with industry standards organizations and alliances – such as the Electric Power Research Institute (EPRI) and Institute of Electrical Engineering (IEEE) – to ensure that our requirements and assumptions are aligned with the standards and products being deployed throughout the industry. In choosing our FAN technology, we have relied on information from industry experts and systems integrators on actual installations of the FAN technology, public records on other utility implementations, and information through participation in industry research programs such as EPRI. The Wi-SUN and WiMAX networks are standards-based network solutions that conform to IEEE standards.

The Wi-SUN mesh system, in particular, benefits from the availability of additional devices. In the case of our AGIS initiative, once we deploy AMI, we expect to have a high density of devices that will need to communicate data to our data centers. For most traditional point to multipoint (PTMP) communication systems, like cellular carriers (or the WiMAX system if it were deployed independently), adding more devices results in splitting resources between those devices.

However, since Wi-SUN is a "mesh" network, adding more nodes to the network means the devices have more options to communicate with their access point. For example, adding a new capacitor bank could mean that meters nearby would have a more reliable and efficient way to reach their communications destination through the network. Further, if other "smart" devices are added, such as streetlights, there would be additional nodes located at greater heights (which can "see" more physical space) to the system, which could mean a meter may only be two communication "hops" (that is, one portion of a communication signal's journey from one device to the next—here, between two devices in the mesh network) away from an access point rather than three—reducing the latency of that communication.

In addition, the Wi-SUN mesh network will be able to reconfigure itself to respond to any ongoing environmental change, such as radio frequency interference, outages, and traffic congestion on the network itself. In short, the network improves as more devices are brought online and within the FAN.

The IEEE 802.15.4g standard forms the foundation of Wi-SUN and is incorporated into the latest revision of the parent standard, IEEE 802.15.4-2015. While this means that IEEE 802.15.4g is administratively superseded, its features and functions are wholly included in IEEE 802.15.4-2015. We additionally note that the industry continues to refer to IEEE 802.15.4g as the component of 802.15.4 that is specific to wireless smart utility networks.

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