UNIT V

HAN and BPL

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Media for SCADA and smart grid communication

The media discussion is divided into two parts: guided, where there is a physical medium to carry the data, and unguided, where there is no physical medium to carry the data and the transmission is wireless.

Guided Media

Twisted pair- Twisted-pair cables are basically used in telephone lines to provide voice and data channels. Unshielded twisted-pair cables are commonly used. LANs also use twisted-pair cables.

Coaxial (coax) metallic cable-

Optical fiber

Power line carrier communication (PLCC)

Power line carrier communication (PLCC) occurs when a power line that carries 50 Hz voltage and current is used to carry data signals also at a different frequency. This is an economical means of transmitting data over the existing power line, as additional media are not required. There are different PLCC techniques for different uses: as a power line carrier (PLC), distribution line carrier (DLC), and broadband over power lines (BPL).

Broadband over power lines (BPL) works by coupling RF energy to the existing electrical power lines inside homes. In BPL technology, the principles of radio, wireless networking, and modems are combined, and a mechanism has been created where one can plug in the computer using BPL modems into any electrical outlet at home to have instantaneous access to high-speed Internet, instead of wiring additional data cables.

BPL operates at frequencies higher than traditional power line communications, typically in the range of 2 to 80 MHz.

Many power line devices use orthogonal frequency division multiplexing (OFDM) to extend Ethernet connections to other rooms in a home through the power wiring.

BPL can also serve as a technology for home automation and for data access from a smart meter.

Home Area Network (HAN)

A home area network connects all the components of the HEM(Smart homes with home energy management systems (HEMs)) system, including the sensors, measuring devices, smart appliances, and any displays into a network for implementation by transferring the monitoring and control data as required.

There are different technologies used in building the HAN backbone, depending on the communication technology and protocol used.

Efforts are ongoing to standardize the technologies used, and the three technologies include

(1) Zigbee wireless standards that connect the widest range of home devices, to work together with the control facility;

(2) using the power line wiring in the network with smart plugs that will have specific IP addresses and can be monitored and controlled by the HEMs;

(3) using the Z wave open standard for wireless which will enable the compatible devices to communicate and build an effective HAN.

However, integrating various technologies for a homogeneous HAN is still a challenge as interoperability is an issue and also the security and privacy of the customer information must be ensured.

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