lamaPLC Communication: DASH7

DASH7 Alliance Protocol (D7A) is an open-source wireless sensor and actuator network protocol, which operates in the *433 MHz, 868 MHz and 915 MHz* unlicensed ISM/SRD band. DASH7 provides multi-year battery life, range of up to 2 km, low latency for connecting with moving things, a very small open-source protocol stack, AES 128-bit shared-key encryption support, and data transfer of up to **167 kbit/s**. The DASH7 Alliance Protocol is the name of the technology promoted by the non-profit consortium called the DASH7 Alliance.

In January 2009, the U.S. Department of Defense announced the largest RFID award in history, a $429 million contract for DASH7 devices, to four prime contractors, namely Savi Technology, Northrop Grumman Information Technology, Unisys and Systems & Processes Engineering Corp. (SPEC).

BLAST networking technology

Networks based on DASH7 differ from typical wire-line and wireless networks utilizing a “session”. DASH7 networks serve applications in which low power usage is essential and data transmission is typically much slower and/or sporadic, like basic telemetry. Thus, instead of replicating a wire-line “session”, DASH7 was designed with the concept of B.L.A.S.T.:

- Bursty: Data transfer is abrupt and does not include content such as video, audio, or other isochronous forms of data.
- Light: For most applications, packet sizes are limited to 256 bytes. Transmission of multiple consecutive packets may occur, but is generally avoided, if possible.
- Asynchronous: DASH7's main method of communication is by command–response, which by design requires no periodic network “hand-shaking” or synchronization between devices.
- Stealth: DASH7 devices do not need periodic beaconing to be able to respond in communication.
- Transitive: A DASH7 system of devices is inherently mobile or transitional. Unlike other wireless technologies, DASH7 is upload-centric, not download-centric, thus devices do not need to be managed extensively by fixed infrastructure, i.e., base stations.

Sub 1-GHz

D7A utilizes the 433, 868 and 916 MHz frequencies, which are globally available and license-free (ISM-Band).

Sub 1-GHz is ideal for wireless sensor networking applications, since it penetrates concrete and water, but also has the ability to propagate over very long ranges without requiring a large power draw on a battery. The low input current of typical tag configurations allows operating on coin cell or thin-film batteries.

Localization

Localization techniques can be applied to DASH7 endpoints. An accuracy of 1 m using DASH7 beacons at 433 MHz has been achieved in a lab experiment.

Range

DASH7 provides a link budget of up to 140 dB with 27 dBm transmission power, which positions the technology as medium-range, compared to short-range (Bluetooth, Wi-Fi, …) and long-range (LoRaWAN, SigFox). Note that higher ranges are always obtained at the expense of per-bit power consumption and transmission duration. Low-power long-range technologies are generally not truly bi-directional, as the regular scanning duty is pretty high. In this context, DASH7 is a very good compromise between range, power consumption, and bi-directionality and is very suitable for industrial applications with effective range of 100 to 500 m.

In line-of-sight situations, DASH7 devices today advertise read ranges of 1 kilometer or more, however, ranges of up to 10 km have been tested by Savi Technology and are easily achievable in the European Union, where governmental regulations are less constrained than in the USA.

Interoperability

The DASH7 Alliance is currently working on a certification program that functionally tests the DASH7 devices. The certification is composed of a set of test scenarios covering transactions in different stack configurations (channel, QoS, security). The physical wireless interface is not covered by the certification and will have to comply to local radio regulations.

Sources

Wikipedia (here)

DASH7 topics on lamaPLC

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