



MeshLogic™

intelligent wireless sensor networks

High Technology Systems's MeshLogic™ platform is designed for distributed wireless monitoring and control systems implementation in the area of industrial, commercial, and home automation.



MeshLogic™ typical applications include:

- structural monitoring;
- industrial equipment remote control and diagnostics;
- telemetric systems for research and testing;
- building automation (HVAC, lighting, security, access control);
- mobile objects monitoring and tracking systems (medical patients monitoring, indoor/outdoor people tracking in security applications).

Advantages

MeshLogic™ platform is based on multi-hop wireless sensor networks ideology enabling development of self-configuring and self-healing systems comprising low-power and inexpensive devices.

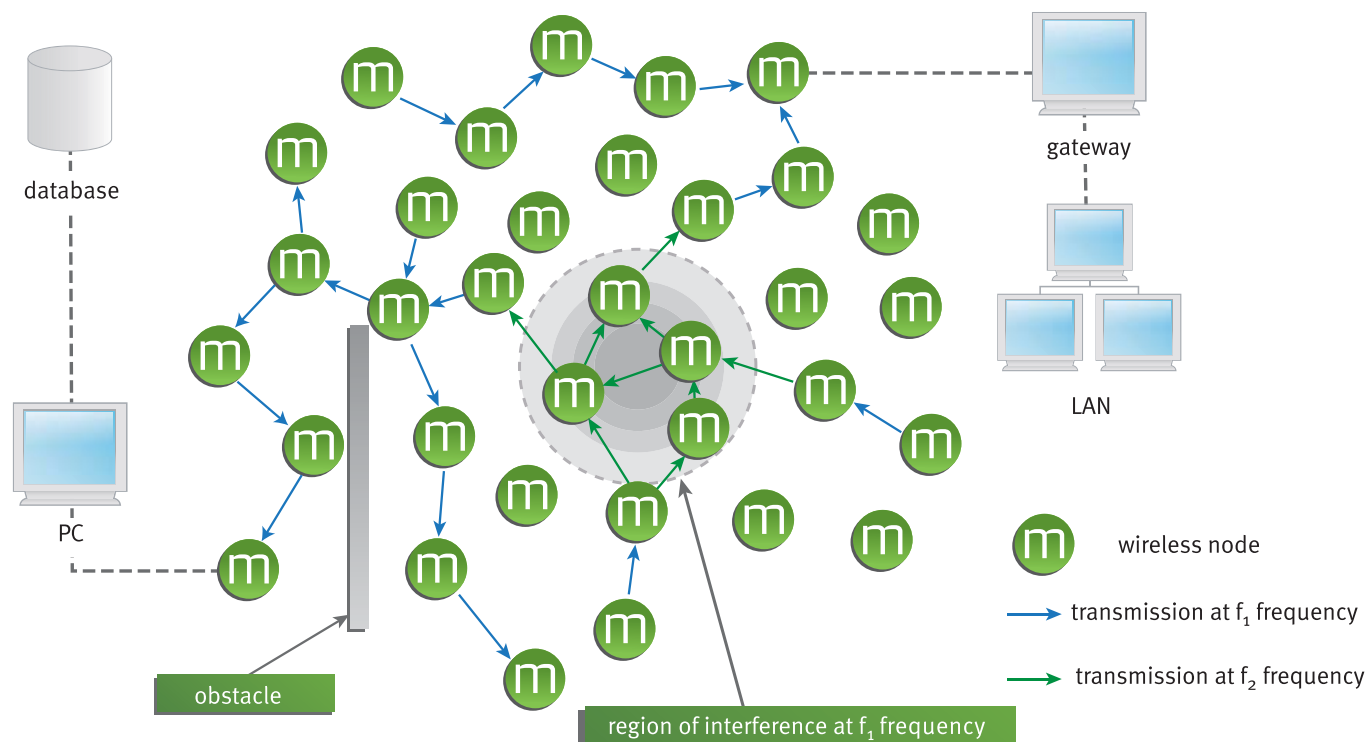
Media access control protocol WG-MAC is capable to select individual node optimal operating mode according to current application requirements and network state to minimize energy consumption.

Co-channel interference resistance is achieved by dynamic channel allocation technique: available frequency band is chosen depending on the local noise conditions, even so different network parts can use diverse channels simultaneously.

High packet delivery reliability, robustness to network topology changes, and system scalability are provided by specially developed routing protocol WG-Route that determines optimal packet delivery path on the fly.

All MeshLogic devices are equal and have identical functionality, peer-to-peer communication is possible between any network nodes.

Currently available RF-modules are based on Cypress WirelessUSB™ interface, but almost any similar transceiver can also be used as a physical level.



Prospects

Advanced approaches to wireless monitoring and data collection systems are feasible due to developed methods of organization of distributed databases for in-network storage of gathered data, local information processing, and querying results on demand.

In collaboration with "Information systems and telecommunications" department of Bauman

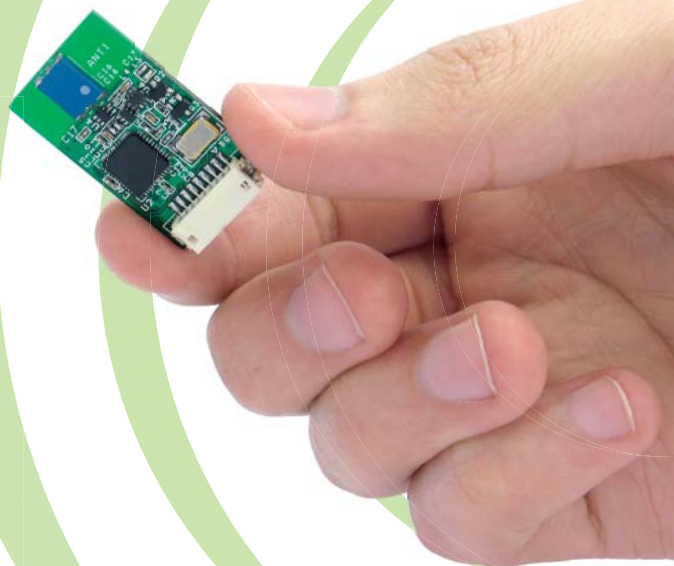
Moscow State Technical University we carry out the research in the area of intelligent wireless sensor networks, comprising nodes capable to exchange information locally, analyze it and make decisions on it's own. Such approach allows to decrease network bandwidth requirements and to extend system scalability and lifetime.

	ZigBee™	MeshLogic™	Description
Frequency band	2,4-2,4835 GHz IEEE 802.15.4	2,4-2,4835 GHz Cypress WirelessUSB	worldwide unlicensed frequency band
Output power	1 mW (0 dBm)	1 mW (0 dBm)	
Modulation	direct sequence spread spectrum 16 frequency channels (2 MHz width)	direct sequence spread spectrum 39 frequency channels (1 MHz width)	IEEE 802.15.4 uses 16 fixed 32-chip PN codes WirelessUSB uses 32- or 64-chip changeable PN codes enabling code division multiple access
Data rate	250 kbps	15,625 kbps 31,250 kbps 62,500 kbps 125 kbps* 250 kbps*	WirelessUSB data rate depends on PN code length, so it is possible to decide between data rate and noise immunity
Interference	direct sequence spread spectrum	direct sequence spread spectrum distributed dynamic channel allocation (DDCA)	according to the local noise conditions MeshLogic DDCA system dynamically selects clear frequency band in a distributed manner
Network topology	point-to-point star mesh cluster tree	point-to-point star mesh	ZigBee does not fully support mesh network topology, all devices are subdivided into 3 functional types all MeshLogic devices are equal enabling true peer-to-peer communication
Network formation	self-organizing network	self-organizing network	unlike ZigBee MeshLogic does not require placement planning for different device types at the stage of designing
Traffic pattern	many-to-one	many-to-one one-to-many many-to-many	ZigBee is oriented to packet delivery from end devices to base station (PAN-coordinator) MeshLogic supports any application specific network traffic pattern
Topology changes robustness	low	high	in ZigBee network topology changes can cause significant overhead due to network reconfiguration and routes discovery process MeshLogic determines optimal packet delivery path on the fly, yielding high stability towards topology changes and scalability
Energy consumption	end nodes run on batteries routers require power supply	all nodes run on batteries	ZigBee coordinator and routers have higher energy consumption depending on current traffic load MeshLogic node dynamically selects optimal operating mode to minimize energy consumption
Stack code size	up to 32 kB	12 kB	stack code size impacts the microcontroller memory resources available to application layer
Applications	home and commercial systems	home, commercial, and industrial systems	due to protocols and algorithms MeshLogic is advantaged in harsh RF environments and non-stationary network topologies

* - available in new Cypress WirelessUSB™ version

Proposal

High Technology Systems company provides services in designing and developing of wireless systems with specific application requirements with the MeshLogic platform assistance including hardware and embedded software development.



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