

XXR Extreme Robust Mode

Communications Algorithm for Noisy Industrial Environments

XXR mode is a narrowband communications algorithm developed to address hostile Industrial environments using Semitech's narrowband powerline communications (PLC) product family. It is the most robust solution for PLC communications. Ideal for Peer-to-Peer connections or a fully mesh networked solution up to a 100 nodes. Ideal for industrial applications, where reliable communications is key and no standard compliance is required.

Available in both Semitech's Chip and Turnkey Module solutions.

Features

- Extremely robust in presence of typical power-line noise interferences
- Quick deployment of simple mesh networks
- Ideal for peer-to-peer communication and seamless serial link extension over PLC

Advantages of XXR

vs. Single Carrier algorithms

Better performance and speed than traditional S-FSK and BPSK algorithms

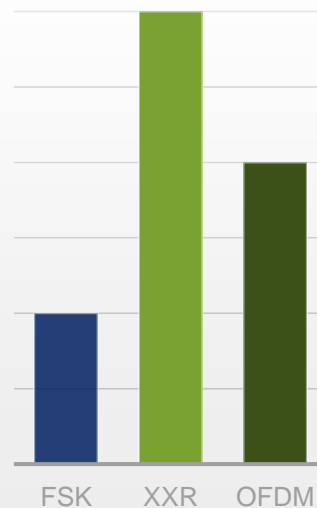
- Flexible channel placement over entire band to avoid noise interference
- Up to 4 independent modems for higher speed or redundancy to improve agility
- RS coded and includes CRC for additional robustness

vs. OFDM algorithms

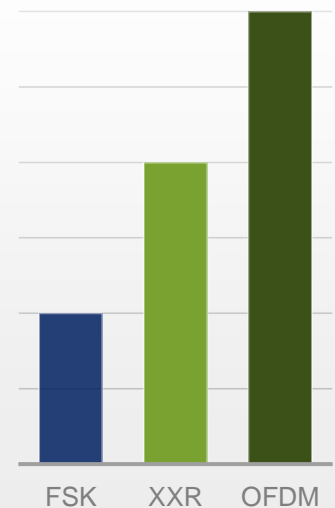
Ideal for applications prioritizing higher noise immunity over data rate

- Impervious to in-band or adjacent band interference of OFDM schemes
- Signal strength per channel is increased when using fewer channels, thus maximizing communication success rate on the usable channels
- Cost effective with unrestrictive Line Driver requirements

Noise Immunity



Data Rate



Applications

- Industrial and agricultural equipment
- Street lighting control
- Solar inverters and alternative energy management
- Building automation
- In-vehicle sensor and Driver ID communications

Technical Features

Channel Placement: 96 possible carriers in the 500 kHz band

- Enables best performance by spreading up to 4 channels across the possible carriers
- Channels can be placed away from interference such as switching noise

Repetition: 1 / 2 / 4

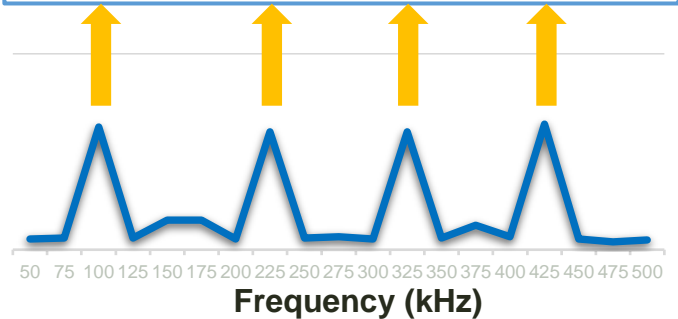
- Higher repetition improves noise immunity (spectrum diversity)
- Lower repetition allows to increase Tx power per channel or increase data rate by adding channels

Active Band: 250 kHz / 500 kHz

- 250 kHz band further improves noise immunity, but limits channel placement
- Use band 250 kHz when higher frequency are not allowed (e.g. CENELEC) or are known to be noisy, otherwise use band 500 kHz for best spectrum diversity

Modulation: BPSK

Channels are placed on selected carrier frequencies to avoid sources of noise
Receiving a symbol on any of the channels guarantees 100% communication success



Mesh Networking

SMESH: “Simple Mesh” Protocol

- Designed for solar, lighting, industrial deployments
- Self-healing and discovery
- Simple network management and firmware update
- Supports up to 100 nodes



SM2400A-MQEQ-Y
Modem Chip

XXR Supported Products



SM2400A-MOD2-FCC
Turnkey Module

Use Case Examples

Native Peer-to-Peer or Simple Mesh

- Serial Protocol API interface

Seamless Serial-to-PLC Bridging

- RS232 and RS485 extension over PLC

SunSpec Rapid Shutdown Capability

- Offerc NEC 2017 compliant signaling interleaved with data communications

Robust N-PLC Mode

Extreme Noise Immunity