

Company Introduction

The Power Line Communication Experts!

Date: April 2024



Smart Grids



Smart Cities



Smart Buildings



Smart Homes

About ECOLINQX™

We partner with our customers for the entire journey

ECOLINQX™ is a US-based Corporation headquartered in California, USA, with engineering resource centers in Osaka, Japan, and Balzer, Liechtenstein.

- Specializing in BPL (Broadband Power Line) communication and networking for Industrial IoT
- Offering both standard and custom products, as well as design engineering services
- Expertise in System Architecture and Design, ASIC, embedded systems, HW/SW design, and application development
- Proven design and manufacturing capabilities
- Supported by Panasonic Holdings Corporation and Nessum Alliance (HD-PLC)
- Servicing customers worldwide



Panasonic



WWW.ECOLINQX.COM

ECOLINQX Technical Expertise



Systems Design & Applications

- Network Analysis and design
- Product definition/Systems design
- Applications/Technical Support



Hardware Engineering:

- Power line transceiver design
- AC/DC and DC/DC voltage regulator
- Microcontroller system design
- Various interfaces such as Ethernet, RS485, DALI, PWM...
- Displays and controls
- EMC at circuit and housing level
- Miniaturization, low-cost, low-power electronics
- Industrial design



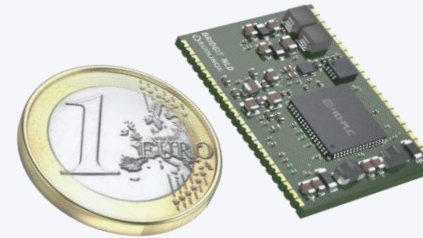
Software Engineering:

- Custom application SW design
- Firmware for RTOS
- Web applications for MCU's
- Software for data visualization and measurement
- Software for production test

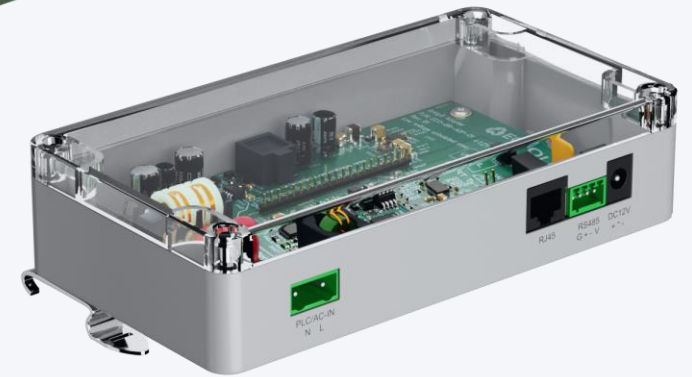
Products and Services

"We make HD-PLC Integration easy!"

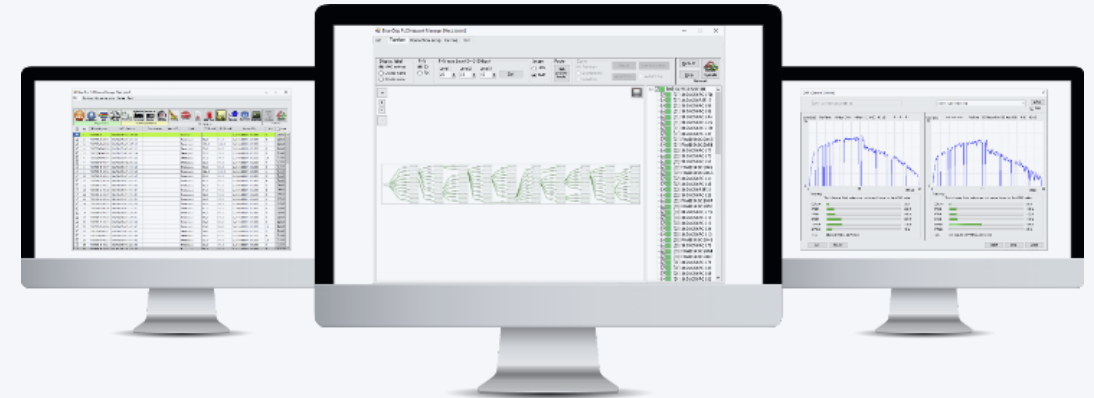
- Business and Technology Consulting
 - ✓ *Free service!*
- BRIDGIT SoM (System-on-Module)
 - ✓ *Highly integrated HD-PLC transceiver*
 - ✓ *IEEE1901-2020 compliant*
 - ✓ *Small, cost-effective, low-power design*
- Evaluation Kit
 - ✓ *Includes the BRIDGIT HD-PLC Adapter, NetworkManager SW, and documentation to evaluate the technology and solutions*
- BRIDGIT™ Development Platform
 - ✓ *Customized End-to-end HD-PLC Communication hardware and software Design and Integration support*



BRIDGIT SoM



BRIDGIT HD-PLC Adapter



NetworkManager Software

Bridgit SoM - An Overview

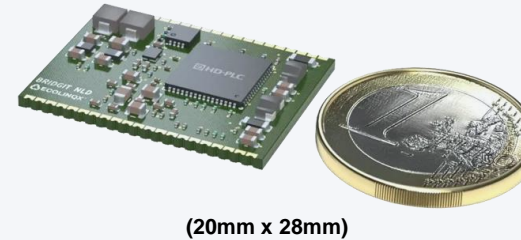
"Fully integrated HD-PLC transceiver Design for your most cost-sensitive Industrial IoT applications delivering the highest communication performance, speed, robustness, response times, and power consumption."

Benefits

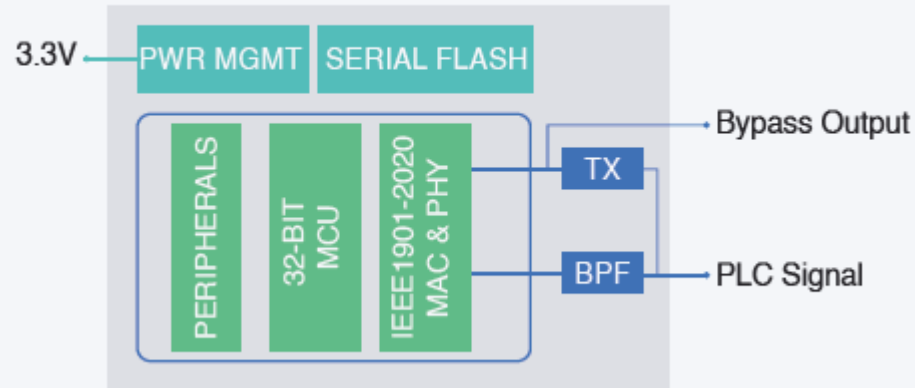
- Reduce time-to-market
- Break through both development cost barriers and bandwidth bottlenecks
- Streamline steps needed to bring your design to fruition
- Simplify product life cycle management
- Ensure signal and power integrity and compliance
- Ensure standards compliance and interoperability
- Eliminate the complexities with PLC design, and integration

Key Features

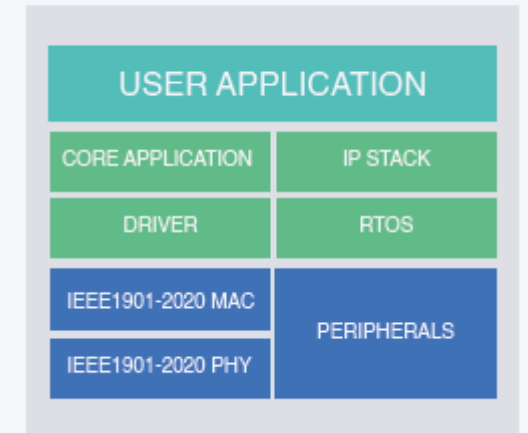
- IEEE1901-2020 HD-PLC Compliant
- Configurable frequency band
- PHY speeds up to 500Mbps
- Range of several Kilometers
- Crypto-strong encryption engine
- Industrial operating temperature
- Meets EN50561-1 EMC requirements
- Low-cost Surface-Mount-Technology package



Block Diagram



Software Stack



Bridgit SoM – Key Specifications

Frequency band	0.5MHz-54MHz
Compliance	CENELEC, FCC and ARIB
PHY/MAC	IEEE1901-2020 "HD-PLC" compliant
Routing	ITU.9905 "CMSR" compliant
Range	Up to 10,000m
Message throughput	> 200 p/s
Latency	~2ms
Encryption/Security	AES-128 encryption w/ dynamic key exchange/ Whitelisting
Internet Protocol	IPv6 protocol
Peripherals/Interface	RMII, UART, I2S, I2C, GPIO, PWM, SPI, IrDA, PDM, and Manchester
Supply Voltage	3.3V
Power Consumption	297mW
Module size	20mmX28mm
Operating Temperature	-40°C to +85°C
Cable Types Supported	AC/DC Power lines, Twisted Pair wiring, CAT5, COAX cable

BRIDGIT SoM

One Design – Two Unique Solutions



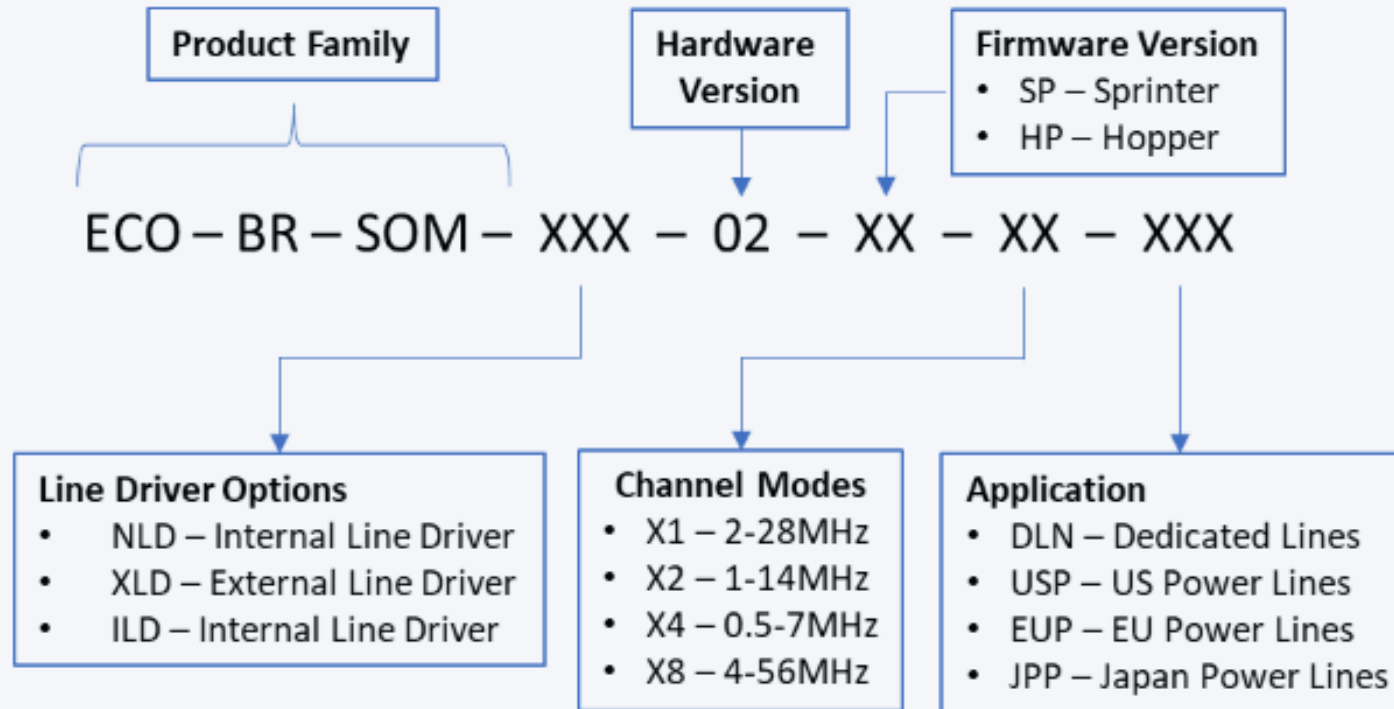
BRIDGIT™ HD-PLC Adapter comes in two versions, “Hopper” and “Sprinter”. Hopper is designed for long-range communication whereas Sprinter is for high-speed communication.

Hopper includes Centralized Metrics Source Routing (CMSR) adding another layer of robustness by enabling any node to act as a repeater extending the range and connectivity.

In addition, BRIDGIT™ HD-PLC Adapter offers an integrated on-board 800-Ohm RX impedance circuit mainly used in BUS network configuration, and a 200-Ohm version for Free Topology networks to further optimize system performance.

HOPPER	SPRINTER
Speeds up to 320Mbps (PHY)	Speeds up to 500Mbps (PHY)
Supports up to 1024 nodes	Supports up to 128 nodes
Free Topology / 10-hop MESH / Repeater CSMA/CA/CMSR	Point-to-Point, STAR, BUS, ring TDM/DVTP
FEC: RS/CC, LDPC	FEC: RS/CC, LDPC
Command and Control of Remote Devices	HD video transmission and local area networks (LAN)

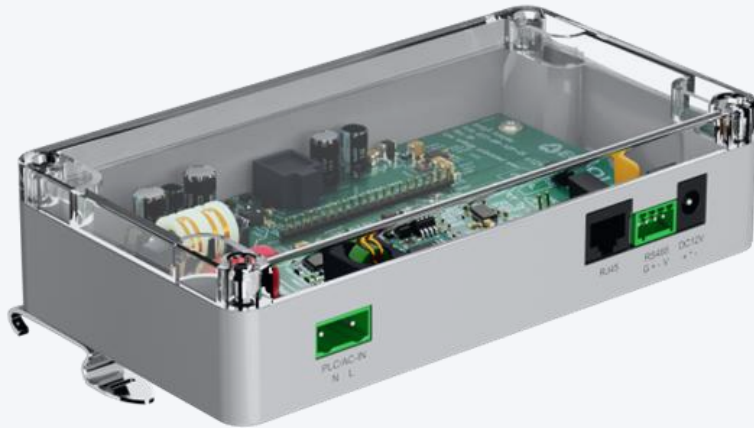
BRIDGIT SOM Ordering Information



* See the latest datasheet for details

BRIDGIT HD-PLC Adapter

- ✓ The BRIDGIT™ HD-PLC Adapter is a complete Ethernet bridge designed to evaluate HD-PLC technology and its performance under various lab and field conditions quickly and easily.
- ✓ The BRIDGIT™ HD-PLC Adapter has everything you need to test Ethernet and/or RS485 over power lines or twisted-pair wiring right out of the box.



What is included

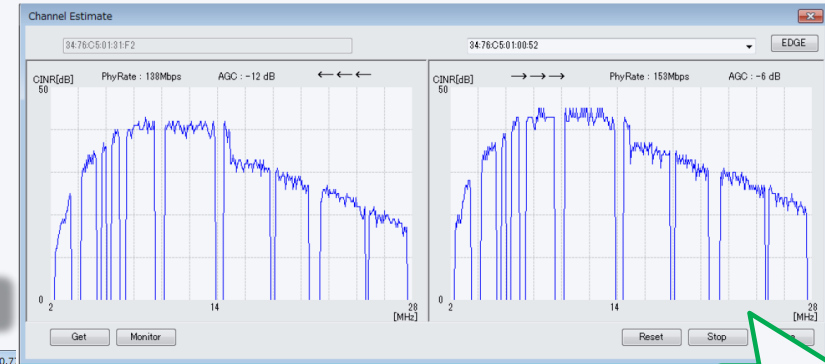
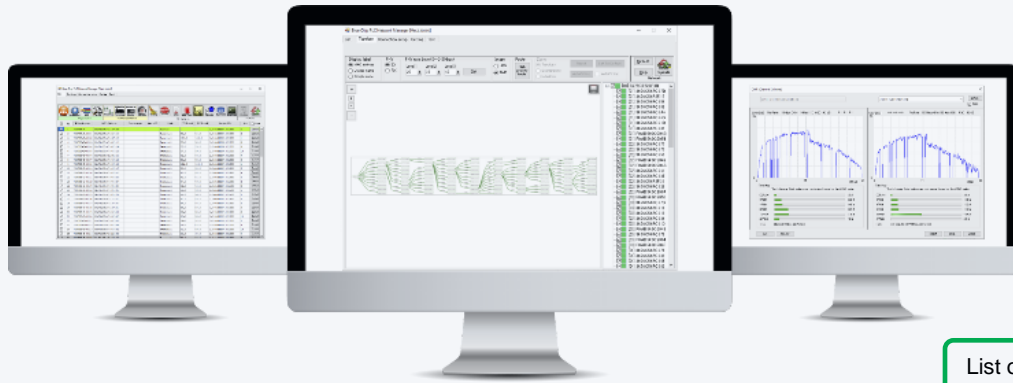
- ✓ 12VDC Power Supply
- ✓ Mating connectors for PLC and RS485
- ✓ NetworkManager PC Software + Manual
- ✓ BRIDGIT HD-PLC Adapter User Guide
- ✓ Streamer firmware
- ✓ Hopper Firmware

Benefits

- ✓ Preconfigured for easy setup and configuration
- ✓ Includes all hardware accessories, software tools, and documentation
- ✓ Bridges Ethernet and/or RS485 over any wired media
- ✓ Configurable frequency band between 500KHz to 56MHz
- ✓ Configurable frequency band from 500KHz to 56MHz
- ✓ Includes SW tools to set up, configure, and update firmware
- ✓ Real-time network analysis and troubleshooting tool is included

BRIDGIT NetworkManager Software

Real-Time Network Analysis and Troubleshooting Tool

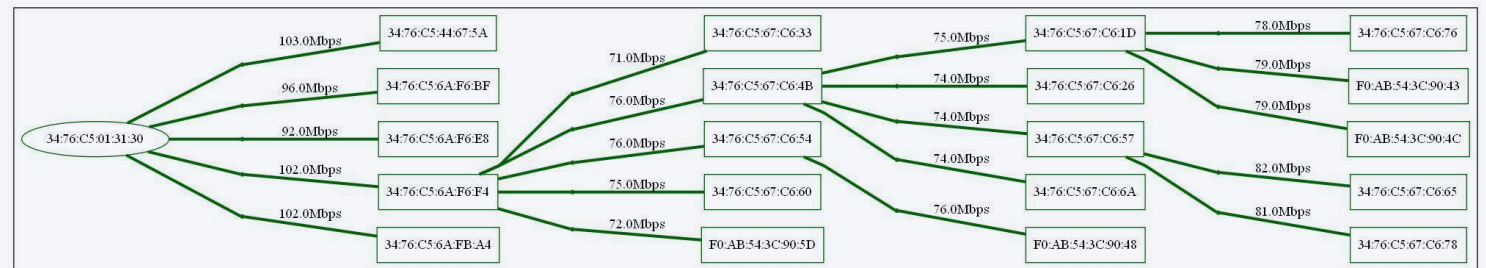


List of network node is available.

CINR of each node can be confirmed.

- Microsoft® Windows® 10 Professional
- Display Network Topology Automatically
- Monitor HD-PLC Devices on the Network
- Configure HD-PLC Devices on the Network
- FW Upload/Updates
- Acquisition/Display the TX/RX PHY Rate
- Acquisition/Display of CINR
- Acquisition/Display of AGC Gain
- Acquisition/Display of Static Transmission Information
- Wave CINR Function

Device name	MAC Address	Device name	Group ID	Mode	TX Speed	RX Speed	Firmware
01317F-M	3476C56A1A13C			Master	205.0		1.03.000450
01317F-T-001	3476C56A1A13D			Terminal		205.0	1.03.000450
01317F-T-002	3476C56A1A13E			Terminal		205.0	1.03.000450
01317F-T-003	3476C56A1A13F			Terminal		205.0	1.03.000450



Network configuration by topology and communication quality of each node can be confirmed.

BRIDGIT SOM – Target Markets and Applications



Smart Cities

- Video Surveillance Systems
- Traffic Control Systems
- Public Lighting Control
- Street Lighting Systems
- Emergency response systems
- Environmental Monitoring



Smart Homes

- Wi-Fi Extenders
- Ethernet Extender
- Smart Thermostat
- Video Doorbell
- IP/Network Cameras
- Security systems



Smart Buildings

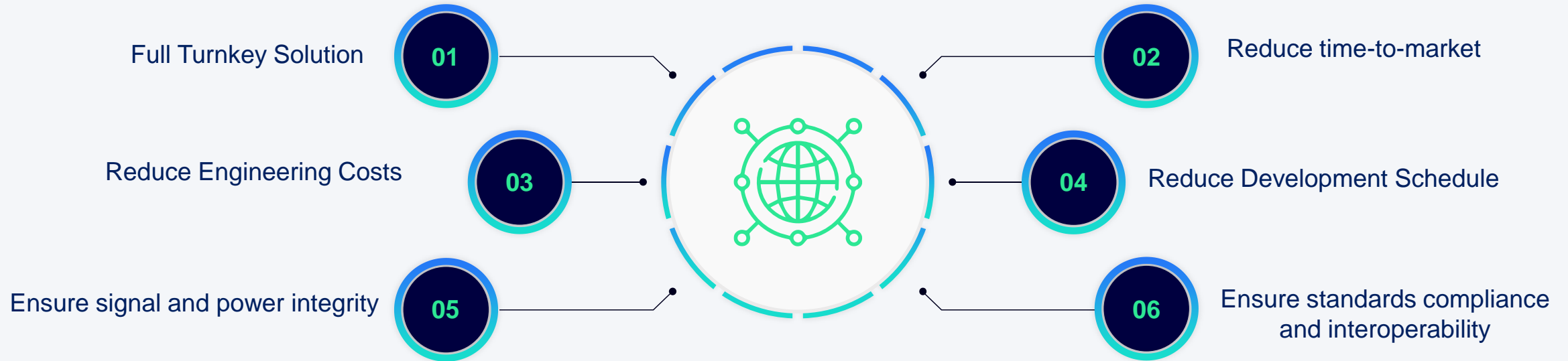
- Energy Management
- HVAC Optimization
- Lighting Control
- Occupancy Monitoring
- Security and Access Control
- Environmental Monitoring
- Fire and Safety Systems



Smart Grid

- Distribution Automation
- Automatic-Meter-Infrastructure
- Smart Meter Gateway
- Energy Management
- Distributed Energy Resources
- EV Charger to Grid (V2G)

ECOLINQX™ Benefits



THE NEW HIGH-SPEED NETWORK

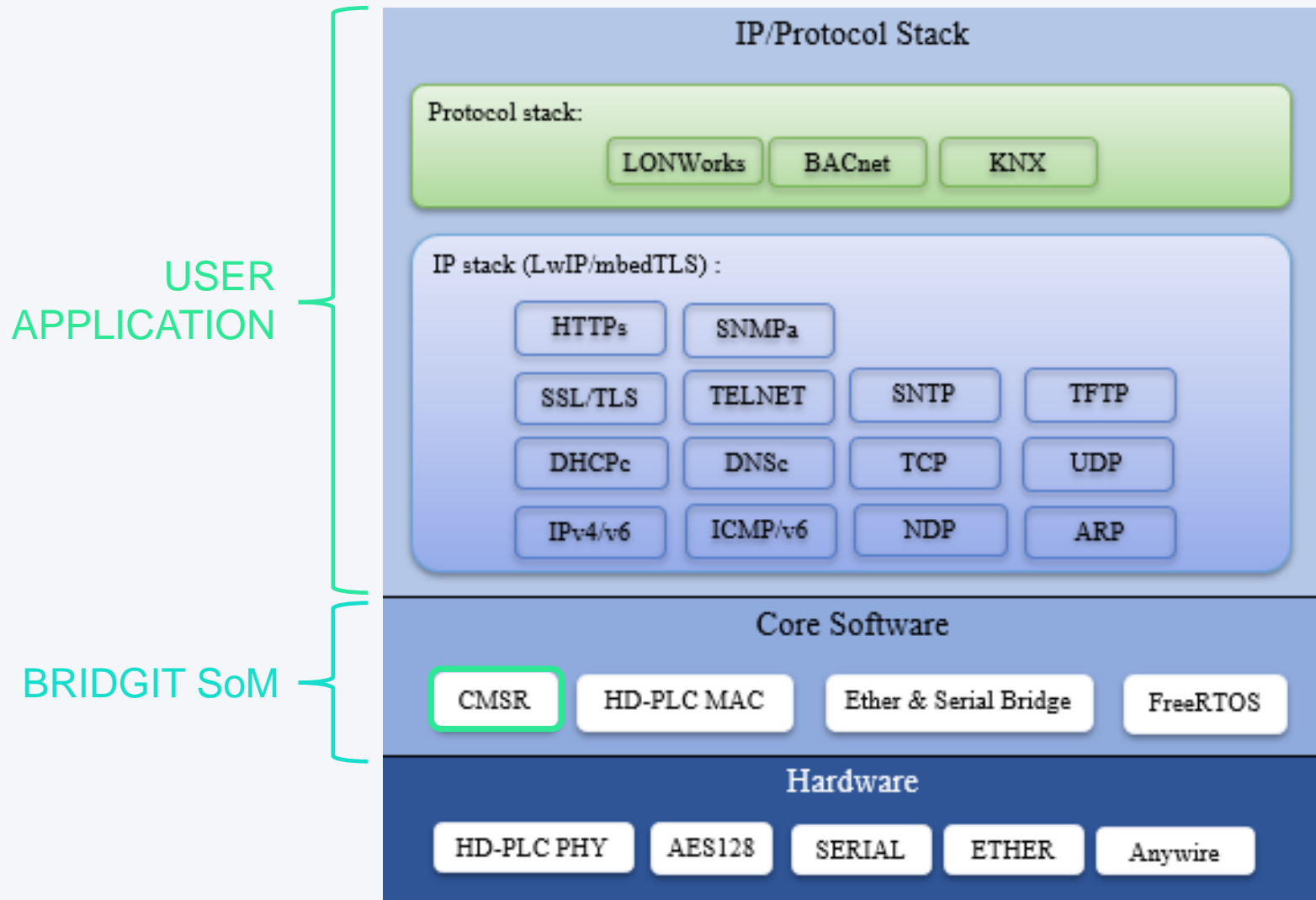
Two fiber optic cables are shown horizontally, one on the left and one on the right. They are connected at their ends, and a bright blue energy burst or light pulse is visible between the two connection points, radiating outwards. The background is a dark blue grid.

BROUGHT TO YOU BY



Bridgit Software Stack

Easy Integration: You define it – We'll implement it

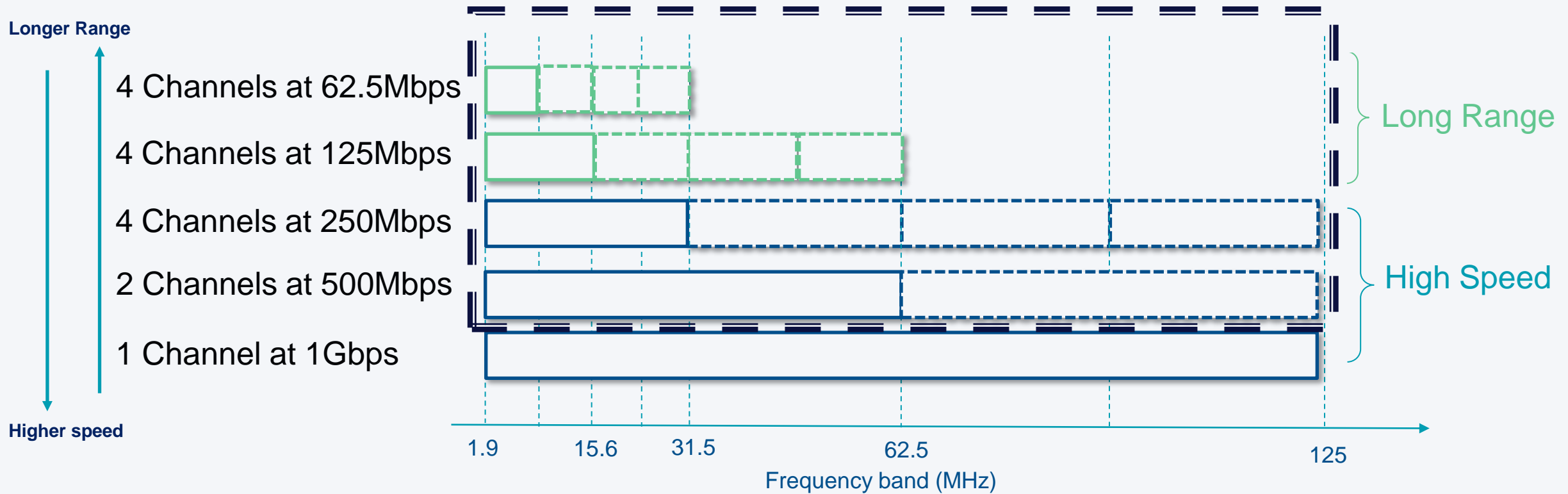


- **32-bit RISC V**
- **FreeRTOS**
- **300Kb RAM/ROM available for user applications**

IEEE 1901-2020: Flexible Channel Wavelet OFDM

Single Standard – World of Applications

BRIDGIT

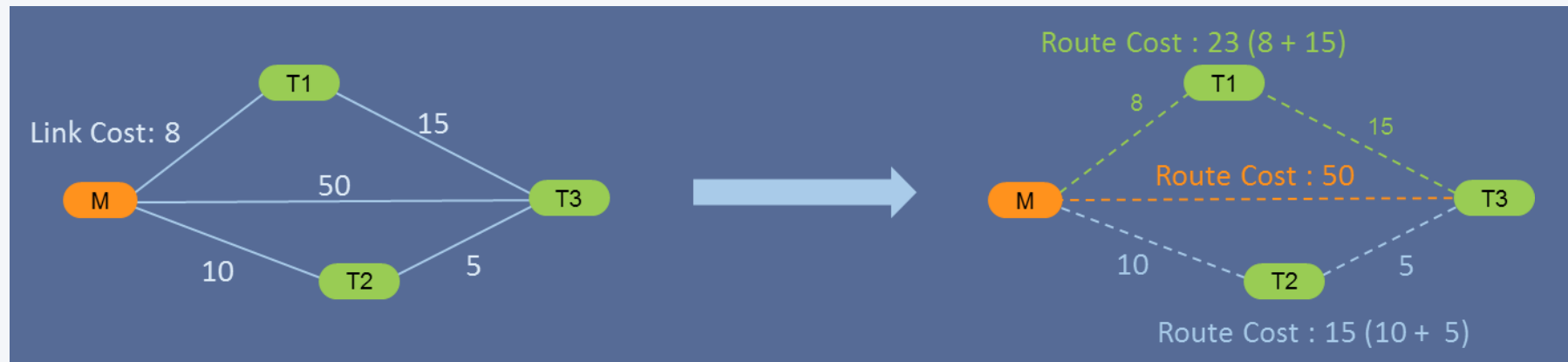


15 User Selectable Frequency Channels

HD-PLC CMSR Routing at a Glance

ITU-T G.9905 Centralized Matric-Based Source Routing Extends Range, Robustness & Scalability

- Dramatically reduces traffic, enabling larger networks.
- Every node can act as a repeater
- Plug-and-play mesh networking
- Periodically exchanges Hello message to calculate and maintain best route
- Calculates link cost of each path to determine fastest route
- Automatically calculates lowest route cost for each node
- Self-optimizing and self-healing



CISPR-32 EMI Test Results

