



Introduction to Socionext's Solution

Socionext
Tomislav Drenski

Nessum

EU Day 2024

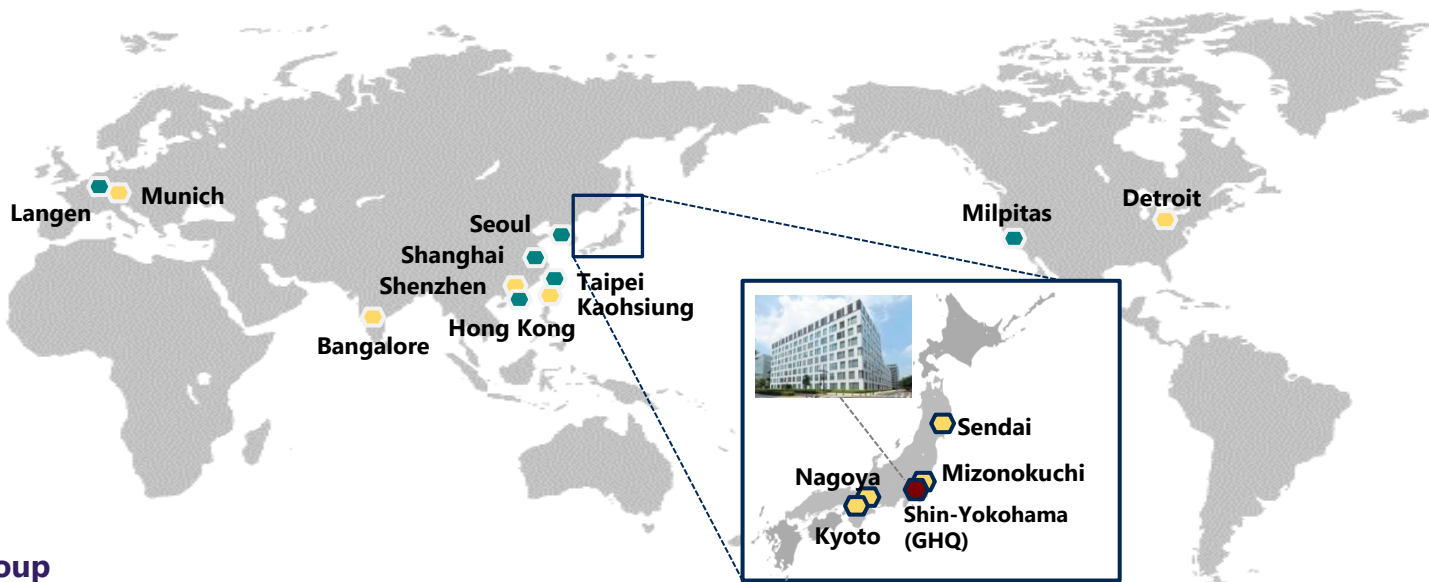
- Company Introduction
- About Nessum Alliance/Technology
- About Socionext's Solution
- Summary

Socionext Company Overview

Company name	Socionext Inc.
Headquarters	Nomura Shin-Yokohama Bldg., 2-10-23 Shin-Yokohama, Kohoku-ku, Yokohama, Kanagawa, 222-0033, Japan
Capital	32.6 billion yen (as of March 31, 2024)
Start of business	March 1st, 2015
Business description	Design, development, and sales of SoC solutions/services centering on SoC
Employees	About 2,500 (as of March 31, 2024)
Group company	6 (North America x 1, Europe x 1, Asia x 4)

Our Worldwide Support Organization Provides High Quality Service to Customers

- Global HQ
- Area HQ
- Offices



Socionext Group

Socionext Inc.

Shin-Yokohama(GHQ), Kyoto, Nagoya, Mizonokuchi, Sendai, Taipei, Kaohsiung

Socionext America Inc.

Milpitas(CA), Detroit(MI), Bangalore(India)

Socionext Europe GmbH

Langen, Munich(Germany)

Socionext Technology Pacific Asia Ltd.

Hong Kong

Socionext Technology (Shanghai) Co.,Ltd.

Shanghai, Shenzhen

Socionext Taiwan Inc.

Taipei

Socionext Korea Ltd.

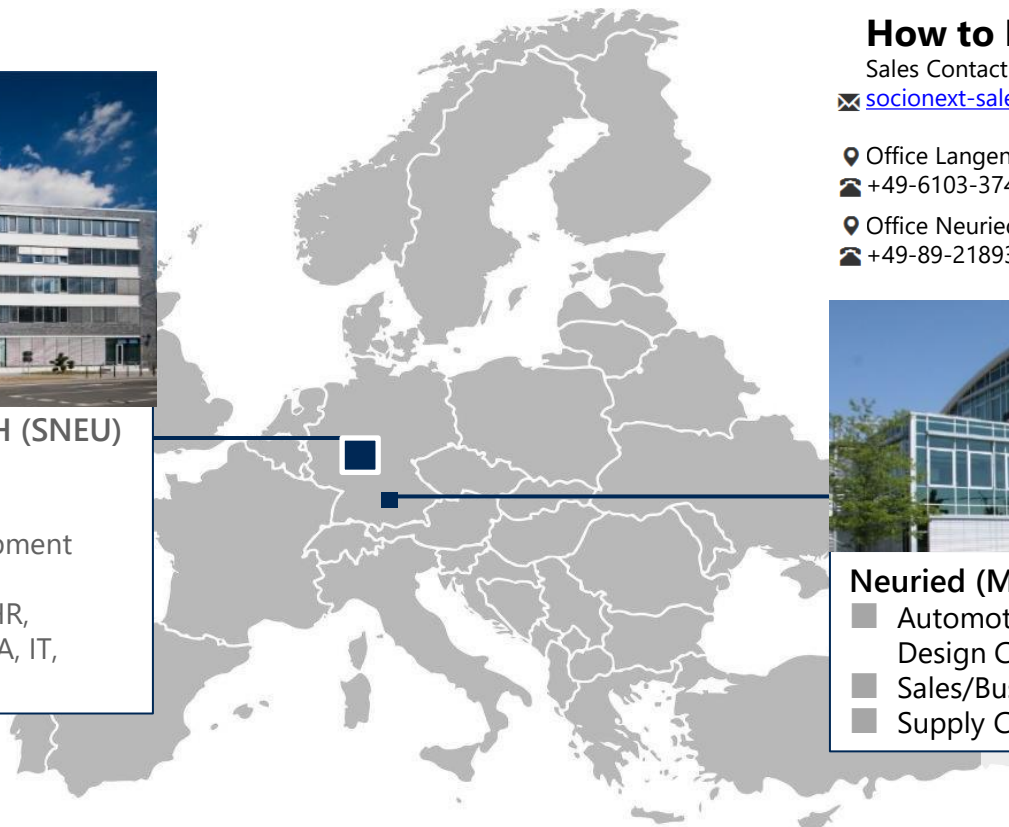
Seoul



Socionext Europe GmbH (SNEU)
Langen, Germany |
Headquarters

- Sales/Business Development
- Technical Marketing
- Corporate Functions (HR, Finance, Purchasing, QA, IT, Marcom, Legal)

* France
Italy
UK



How to Buy

Sales Contact

✉ socionext-sales@eu.socionext.com

📍 Office Langen

☎ +49-6103-3745-0

📍 Office Neuried

☎ +49-89-218938-4450



Neuried (Munich), Germany

- Automotive Solution Team & Design Center
- Sales/Business Development
- Supply Chain Management

Business Scope for EU-Day

Data Centre & Networking

Automotive

- ADAS
- HMI

Industrial

- Automation
- Office Solution

Smart Devices

- Camera
- AR/VR

IoT & Radar Sensing

- **Nessum**
- LPWA
- Radar Sensor
- ...etc.

Advanced Driver-Assistance System
Human Machine Interface
Low Power Wide Area
Augmented/Virtual Reality

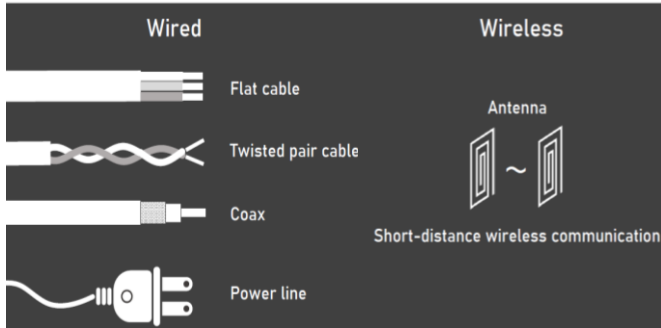
- Company Introduction
- **About Nessum Alliance/Technology**
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NESSUM Rebranding / History

- In 2006: Panasonic had idea of using (HD) Power Line Communication in TV & Video applications (in JPN).
- Sep 2007: HD-PLC Alliance (now Nessum Alliance) was established as a certifying body for communication devices that comply with the international standard IEEE 1901.



- The term "power line communication" no longer accurately reflects the technology due to introduction of new applications.
- It started being used not only for power lines, but also any other metal lines and even wireless.



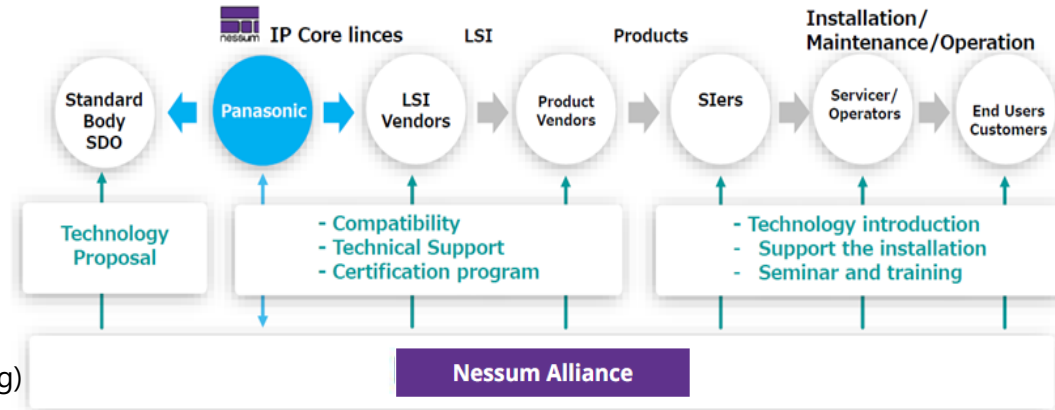
- It became an international standard as IEEE P1901c (ongoing)
= Any Media Communication

HD-PLC Alliance will challenge a new stage with a new name, "Nessum Alliance,"

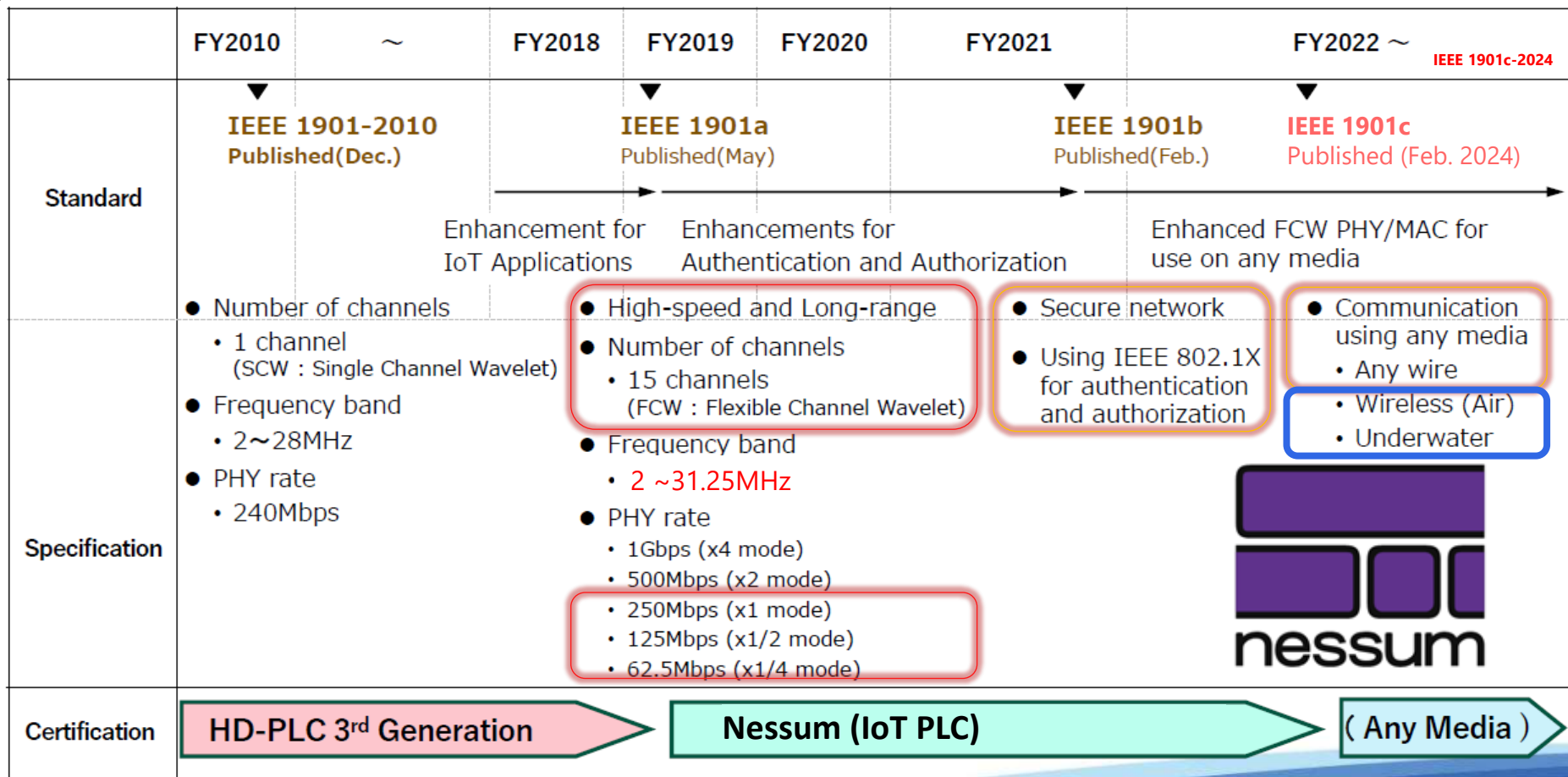
from October 2nd, 2023. → Socionext just started using new name



- Within Nessum profiles according to different use cases and applications are being defined.
- Allows easy implementation for various solutions in Ecosystem



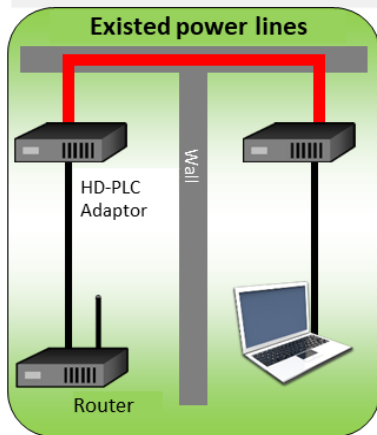
NESSUM History (overview of IEEE1901 Standard & Certification)



Features of Solution

Nessum Solution by Socionext

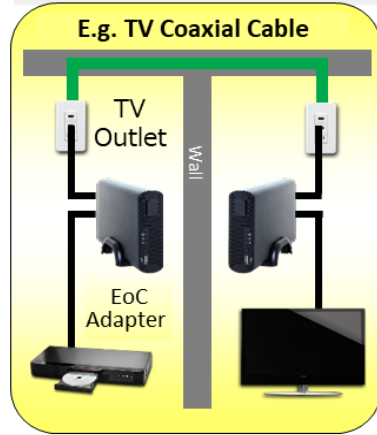
Power Line



No installation needed

(Works on distributor may be needed)

Comms Cables



No works for installed cables

(New cables may be needed)

High Security (Wired) **AES128 & Modulation**

~95Mbps

High Speed Comms

95Mbps

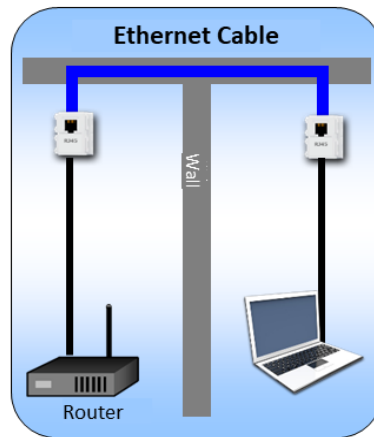
Easily affected by noises

Stability

Stable comms

VS Known Technologies

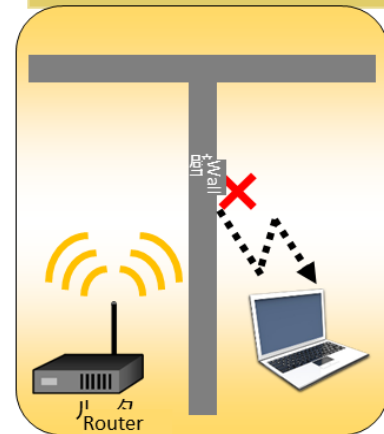
<Ethernet>



- Installations needed
- Most are star topology
- Need hubs beyond 100m
- No security guarantee
- Easily affected by environment

Suitable for short/limit distance

<Wi-Fi>



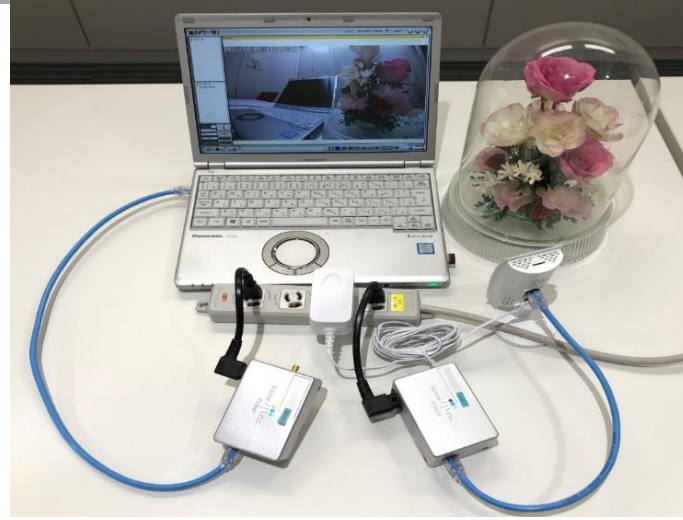
- No installations needed
- AES128 adopted; concerns on security
- Comms issues caused by walls; easily affected by environment

Suitable for battery-relied application

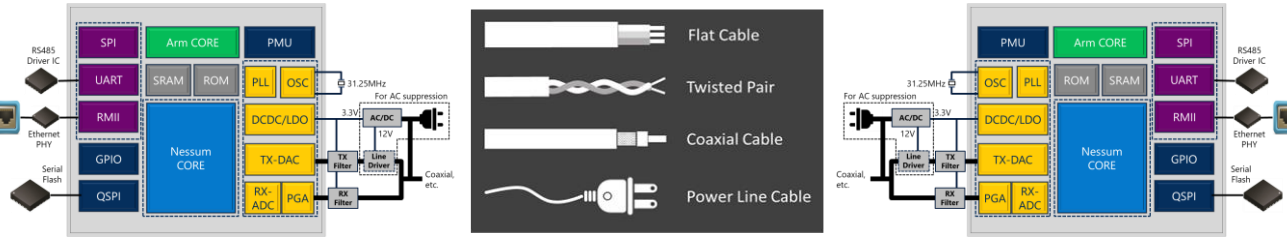
Features of Solution - Example

Where is the "last one mile"?

- Coexistence or back-up/secondary system
- Main or bridging/supporting technology



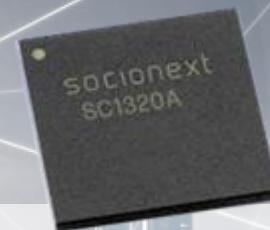
No connections to the wireless



Cannot connect by ethernet cable

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HOME | URBAN | FACTORY



Nessum Communication IC

Enables IoT applications over short-range wireless and existing wired infrastructure

Nessum leverages the installed infrastructure through its support for various types of cables, such as powerline, coaxial, flat and twisted pair. Additionally, Nessum excels short-range wireless data transmission, both in air and water environments. Nessum features reliable data transmission and intelligent device management tailored for smart city, residential, commercial and industrial applications. The SC1320A IC incorporates Nessum technologies, efficient and cost-effective IoT applications.

Application Areas

- Smart City
- Smart Building
- Smart Factory
- Process Automation/Robotics
- Industrial Cameras/Security
- Equipment control
- Smart Metering & SMGW
- Smart Street Lightning
- Smart Parking & EV-Charger
- HVAC Systems
- Energy Control & Management
- and many more.....



Nessum is the former HD-PLC Solution/Alliance that evolved to a new stage since it is used beyond the power line communication bridging the IoT Gap.

Target of Solution

Solve existing challenges on communications – by enabling:

- **data & communication exchange or secondary 2nd backup**
- **easy & reliable monitoring, controlling, switching of any device or system**
- **using existing cable / network infrastructure.**

Possible User Cases (some ideas):

- **Smart meter / Smart Meter Gateways / Smart Grid**
 - **High data rate (compared to both Wi-SUN and other PLC) for smart meter with secure & long distance communication.**
 - **PV (Photovoltaics) / Solar Power (High affinity with microinverter systems, can control individual inverters without the need for dedicated communication lines)**
- **IoT & Society 5.0 product including Smart Home, Smart Building, Smart City or Industrial complexes**
 - **Stable / secure communication or monitoring / switching of devices, systems or entire networks**
 - **Street Lighting application (light & sensor / video / signs/ads), emergency lighting**
 - **Video, surveillance...**
- **Tunneling/Shafts/Pipes**
 - **Enclosed environment where wireless technologies cannot be used (Elevator, Tunnels/ Tubes/ Pipes...)**

Socionext's Solution with Latest Nessum Tech

Active IEEE WG working on new features



2022



2015

2010

2006

Items		Generation	NESSUM IEEE 1901-2020 / ITU-T G.9905	HD-PLC3 IEEE 1901	HD-PLC2	HD-PLC1
Channel Functions (mode select)			<ul style="list-style-type: none"> 2x mode, 4x mode: High speed (optional) 1x mode: Standard 1/2x mode, 1/4x mode: Long distance 	N/A	N/A	N/A
Available Bandwidth ASSP is 2~31.25 MHz ready based on IEEE P1901c **			<ul style="list-style-type: none"> 2~28MHz: 1x, 1/2x, 1/4x modes 2~100MHz: 4x mode (optional) 	2~28 MHz	2~28 MHz	4~28MHz
PHY Rate (Max)			<ul style="list-style-type: none"> 250Mbps: 1x mode 1Gbps: 4x mode (optional) 	240Mbps	210Mbps	190Mbps
Comms Distance (Max)	w/o MHP*		<ul style="list-style-type: none"> 400m: 1x mode 1,000m: 1/4x mode 	200m	200m	150m
	w/ MHP*(10 hops)		<ul style="list-style-type: none"> 4,000m: 1x mode 10,000m: 1/4x mode 	2000m	N/A	N/A

*MHP=Multi-Hop. When this function is enabled, the terminal (slave) device(s) can be deployed as repeater(s) and the network will be become MHP-supported. When the node(s) does not function in the usual transmission route and caused no is not working, the MHP-supported network could configure other alternative node(s) as a replacement for valid communication.

Technology used: Wavelet OFDM; can form deep notches and achieve highly efficient transmission (PAM2 to pAM32).

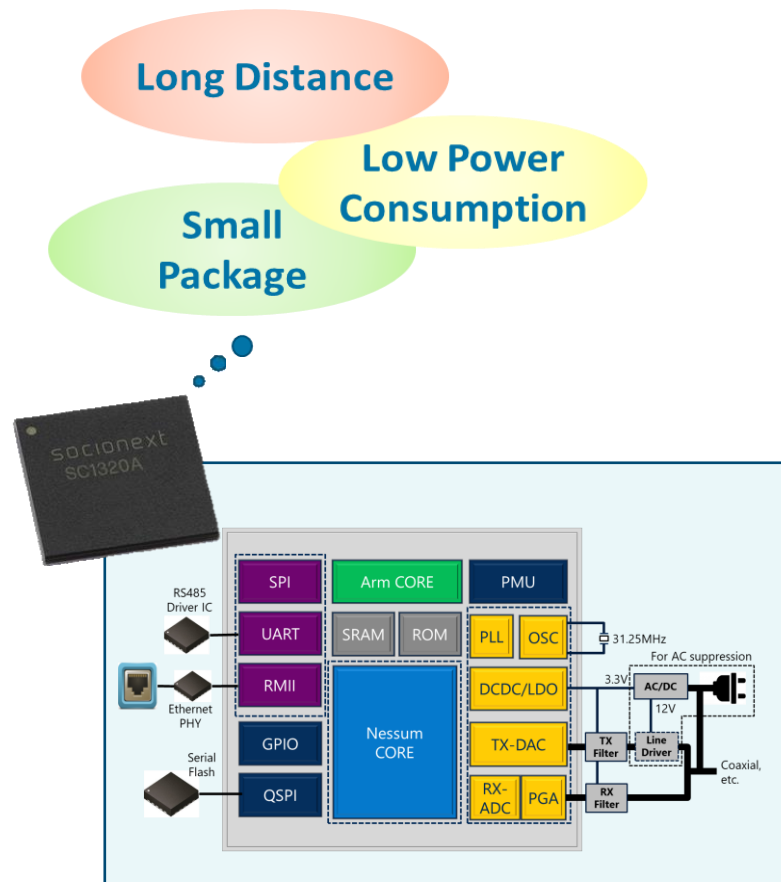
Available Bands in 7 Modes: 7.813, 15.625, 31.25 (each 512 Carriers). Carriers have flexible programming/notching.

Cell Size: Theoretically unlimited; based on chip up to 1024. Long-range and/or wide-area networks be established.

Best coverage PLC / BPL solution with significant improvements to IEEE 1901-2010

SC1320AF2: Brief Specification

Item	SC1320A	Note
CPU	Arm® Cortex®-M series 125MHz	
Interfaces	SPI/UART/RMII	Support various connections
Nessum Core	Nessum (HD-PLC4)	incl. ½ and ¼ rate modes
Distance	Max: 10km	Nessum feature
Power Supply	3.3V single	Built-in DCDC for optimizing BOM cost
Power Consumption	200mW (Typ)	In-house technology
PKG	QFN 7x7 mm	Small PKG for compact design
Temperature	-40°C~85°C	



Product Features: Long Distance Comms

Band division of 1/2x and 1/4x mode and channel IDs

1x mode

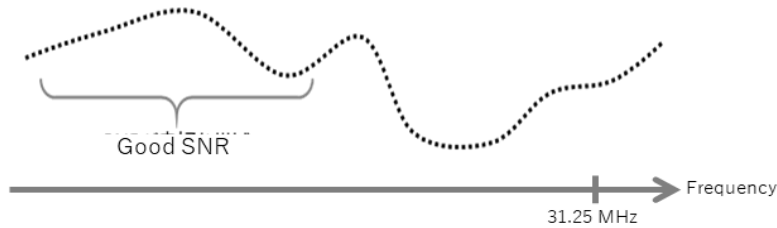
Channel ID: x-1			
x-2		x-3	
x-4	x-5	x-6	x-7

1/2x mode

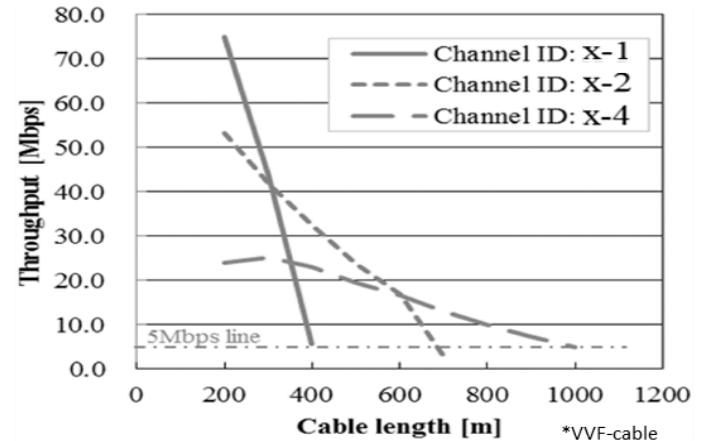
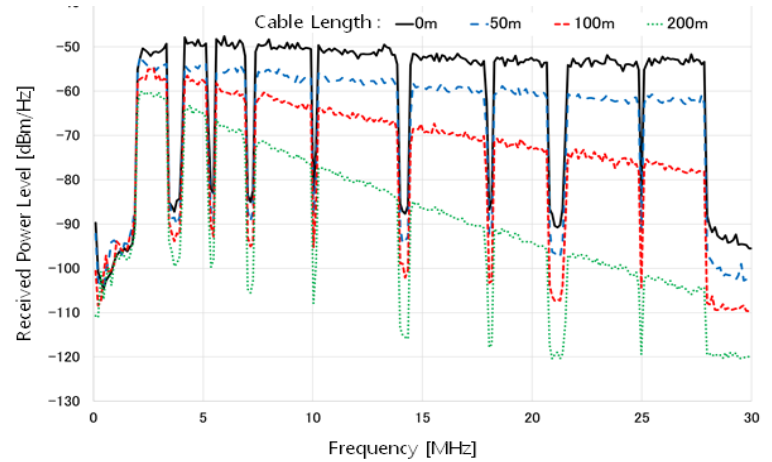
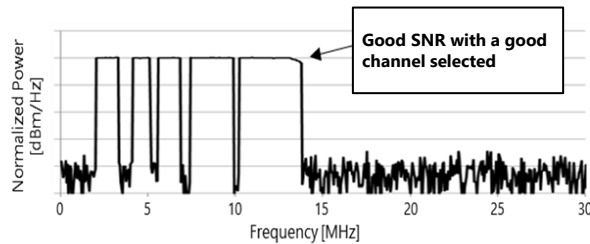
1/4x mode



Transmission Path SNR (Signal-to-Noise Ratio) feature



Spectrum of x-2 while it is selected of 1/2x



Product Features: Long Distance Comms [x-2]

Band division of 1/2x and 1/4x mode and channel IDs

1x mode



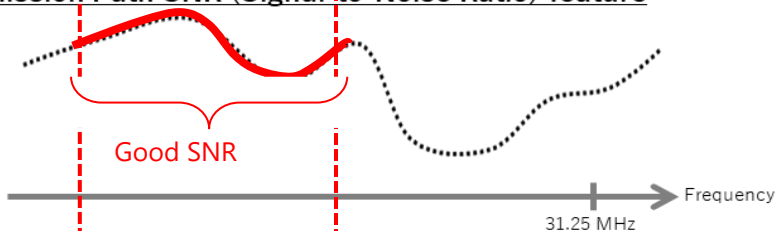
1/2x mode



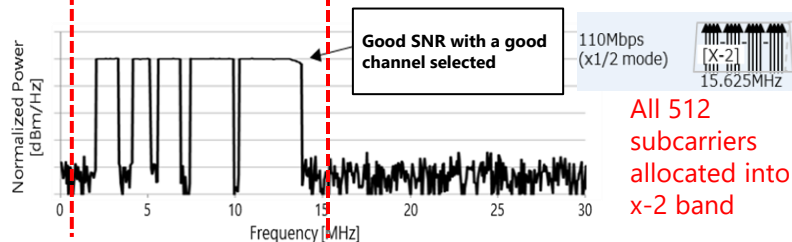
1/4x mode



Transmission Path SNR (Signal-to-Noise Ratio) feature

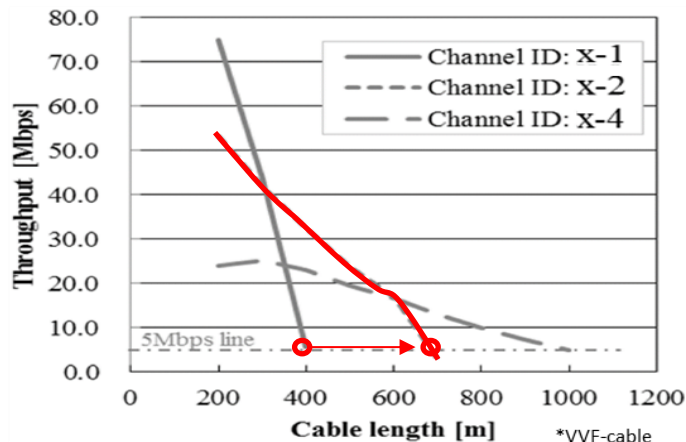
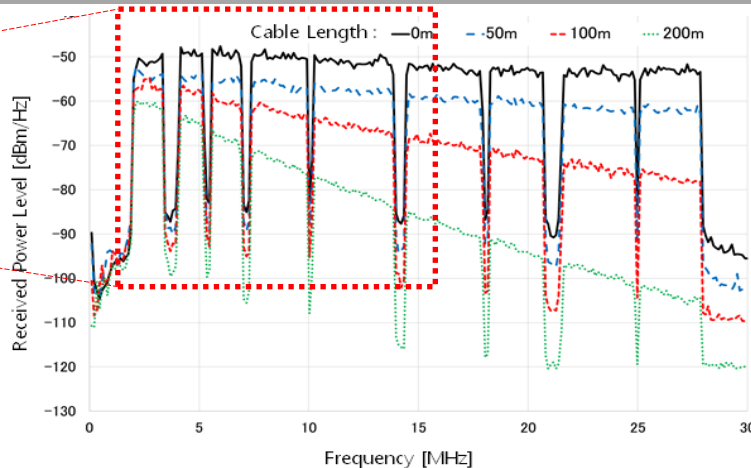


Spectrum of x-2 while it is selected of 1/2x



Note: lowest band for G.hn is 25MHz

All 512 subcarriers allocated into x-2 band



Product Features: Long Distance Comms [x-4]

Band division of 1/2x and 1/4x mode and channel IDs

1x mode

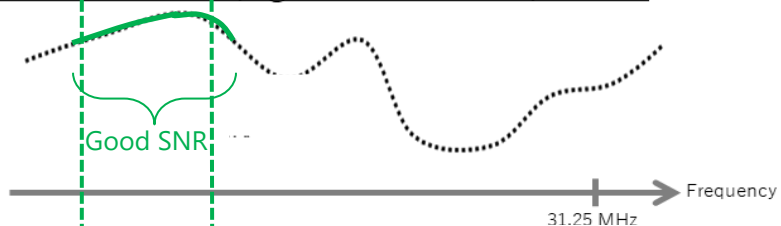
Channel ID: x-1			
x-2		x-3	
x-4	x-5	x-6	x-7

1/2x mode

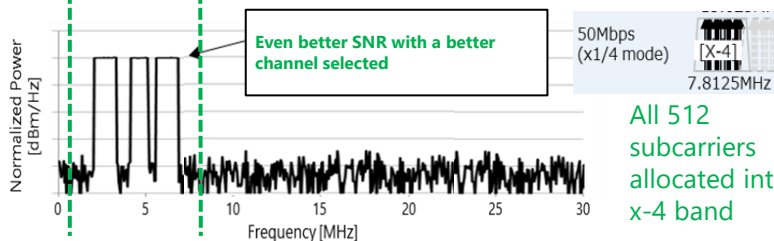
1/4x mode



Transmission Path SNR (Signal-to-Noise Ratio) feature

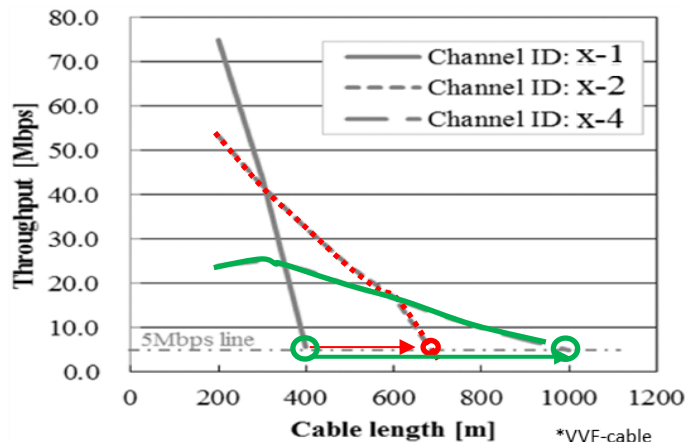
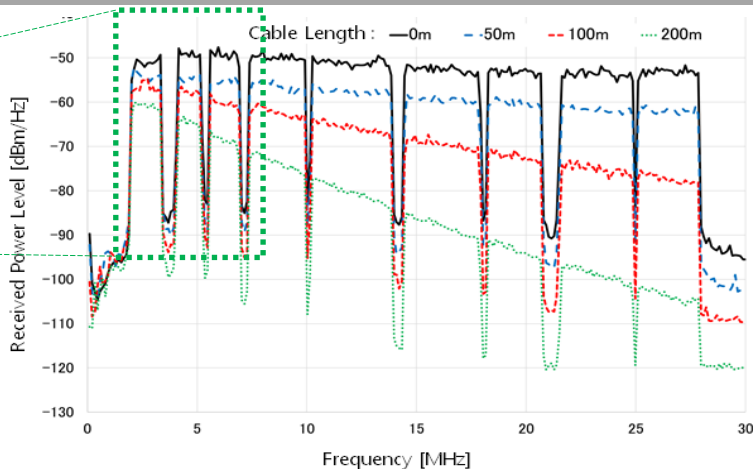


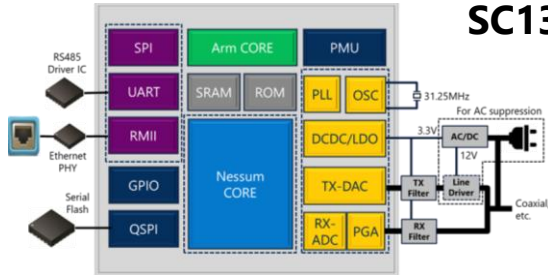
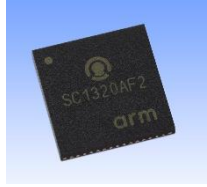
Spectrum of x-2 while Spectrum of x-4, selected in 1/4x



Note: lowest band for G.hn is 25MHz

All 512 subcarriers allocated into x-4 band





SC1320AF2 MP

- 4th generation Nessim core
- Low power & compact package
- Reduced peripheral parts
- Built-in TCP/IP protocol processing for installing on products

SDK:

-Software Development Kit

Documentations:

-Specifications

-Design Guide

-EVK Manual

-Reference Design



SC1320A-B03 EVK

Incl.: SC1320AF2-ES-002



AC Adapter



Cable for Comms / Powerline

Master



Ethernet



Evaluation Tool

- CINR monitor
- MHP configuring
- Power Level config
- Channel monitor
- Speed monitor

Terminal



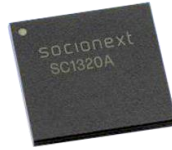
Ethernet



AC/DC, twisted pair... "any cable"

Socionext Offering [2]

- **EVK & evaluation sample: Available**
- **SC1320AF2: MP shipment started**



Socionext Announces Shipment of the World's First HD-PLC LISI Compliant with IEEE 1901-2020
State-of-the-art, Compact, Low Power Device Supports Existing and New IoT Communication Applications

Highlights: May 26, 2022 – Socionext Inc. today announced sample shipments of the SC1320A HD-PLC communication LISI starting in June 2022 and plans for start volume production in the third quarter of 2022. This LISI is the world's first semiconductor design using an IEEE 1901-2020 compliant IP core licensed by Panasonic Mobile Computing Corporation.

Socionext will provide the SC1320A LISI and evaluation kit at the HD-PLC Alliance booth at the ISA/ISA 2022 held at Hilton Bay Plaza from June 1-3, 2022.

SC1320F Product Overview
<https://www.socionext.com/en/products/SC1320F>

HD-PLC Compliant to Standard IEEE 1901-2020
The high definition power line communication (HD-PLC) is a wired communication technology that supports communication networks by transmitting high frequency signals (1-30 MHz) over existing power lines. Telephone lines, twisted pair power cables, and other wires have 30 MHz, the 4th generation of HD-PLC was published in the IEEE 1901-2020 standard specifying 100 MHz transmission mode to enable longer distance communications. It is capable of utilizing a communication network as the result of a 20-year collaboration with multi-hop technology, with these new features, the advanced HD-PLC solution is expected to become more widely adopted in many different fields and use application areas.

SC1320F Features and Specifications
The SC1320A is the world's first LISI that adopts the 4th generation HD-PLC (F) with an IP core that conforms to the IEEE 1901-2020 standard licensed by Panasonic Mobile Computing Corporation.
Socionext's strength in advanced signal processing, analog frontend and analog design technology enables implementation of the HD-PLC specification and features on the SC1320A while maintaining very low power consumption (200 mW). It uses only a single 3.3V power supply and comes in a compact 7 x 7 mm package. This solution has built-in an SPD1907 and Ethernet MAC (PHY), allowing SC1320A to be easily embedded into home appliances, robots, and IoT products.

Free inquiry: info@socionext.com

Wide Range of Applications
SC1320A can be used for various fields like applications:

It is suitable for controlling and lighting control of buildings, smart cities, and smart homes.

Future Development
Socionext has developed a wider sensor* with a built-in high-order detection of a person's position and movement, and SC1320A** for Home 2.0 completion, low power and low cost LISI for IoT tags, business between the combination of these solutions with the SC1320A LISI can deliver more value to IoT and smart Connected Systems and Services, for example, a high-sensitivity presence detection radar sensor can be used in a comprehensive hybrid communication network incorporating both the SC1320A and the SC1320A.

The small, low-power SC1320A HD-PLC LISI helps companies develop high-end products at a lower cost. Socionext will continue to leverage the IP of generation HD-PLC benefits and features to create new technologies, values, and contribute to the future of society.

Contact information for purchasing products and samples
Contact Form: <https://www.socionext.com/en/contact>

* An AIoT chip (Presence sensing Controller)
** Home Range Sensor
<https://www.socionext.com/en/products/SC1320AF2>

* <https://www.socionext.com/en/products/SC1320AF2>
** SC1320A** LISI for IoT tags
<https://www.socionext.com/en/products/SC1320AF2>

EVK Introduction

socionext
IoT defined by digital intelligence

SPARROW Evaluation Kit (SC1320A-B03): Evaluation System Introduction

■ Overview
The introductory evaluation kit (Model No. SC1320A-B03) is provided for evaluating the performance of SC1320A in a real environment. An example of evaluation system can be configured as follows:

- 1. Main Unit (Evaluation Kit (Main PC)) and 4 in 1 Smart Terminal (Evaluation Kit (Terminal PC)) connected over Ethernet (LAN) and communication.
- 2. HD-PLC LISI (SC1320A) and HD-PLC LISI (SC1320A) are connected to the PC via LAN.
- 3. The power supply module is connected to the PC via LAN.
- 4. The evaluation kit is connected to the PC via LAN.

■ Evaluation Kit Contents (Basic Package)

1. Evaluation Kit (E) * 1
2. Basic PC (PC) * 1 (CPU: i7-10710)
3. PC Cables * 1 (3.5" x 1.5" x 1.5")
4. PC Accessories
5. PC Accessories

* PC: For reference only (not guaranteed by customer's responsibility).
* PC: For reference only (not guaranteed by customer's responsibility).
* Customer's PC: For reference only (not guaranteed by customer's responsibility).
* The power supply module is 12V or 24V.
* Wireless module
* Communication module (RJ45)

* The kit of this system may vary for each model (PC, terminal PC, evaluation kit, power supply module, LAN cable, etc.).

EVK Specification

socionext

HD-PLC™

SC1320A™ Evaluation System Specifications
Introduction

Doc No. EVK-001
August 18, 2022
Revision No. 1.0

1. Overview
1.1. System Configuration
1.2. System Configuration
1.3. System Configuration

2. System Configuration Specifications
2.1. System Configuration
2.2. System Configuration
2.3. System Configuration

3. System Configuration Specifications
3.1. System Configuration
3.2. System Configuration
3.3. System Configuration

PC tools for EVK: User Manual

socionext

HD-PLC™

SC1320A™ Evaluation System Specifications for PC Tools

Doc No. EVK-002
August 18, 2022
Revision No. 1.0

1. Overview
1.1. System Configuration
1.2. System Configuration
1.3. System Configuration

2. System Configuration Specifications
2.1. System Configuration
2.2. System Configuration
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3.1. System Configuration
3.2. System Configuration
3.3. System Configuration

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Socionext's Summary with Latest Nessum Tech

- **LSI UNIQUE SELLING POINTS**

- **SC1320A has very small package size, very low power, and is state-of-the-art device**
- **Conform with latest IEEE 1901-2020 (ITU-T G.9905) standard and is the worldwide first device using the Nessum evolution**
- **SC1320A is easy to use/control and has high security/encryption for data transfer**
- **SC1320A enables long distance communication, with multi- mode/hop function for up to 1024 nodes**
- **SC1320A includes all necessary IoT Device Interfaces (UART/SPI/Ethernet MAC/RMII) and supports existing Industry protocols**

- **Simplifies wiring work & reduce cost by using existing cabling and infrastructure**
- **Nessum is the best BPL solution available to the market with multi vendor access.**

- **Mature solution and Nessum alliance enables world-wide ecosystem and interoperability of Nessum devices/systems with different vendors and many customers focusing on IoT & Society 5.0 and critical and secure infrastructure in the energy sector.**



Aiming for standard adoption
in smart city communication infrastructure

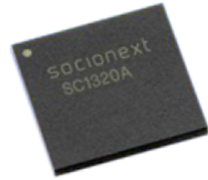
Thank you

Nessum

EU Day 2024



SOCIONEXT for Better Quality of Experience



SC1320A Connect the World Together



Contact details:
tomislav.drenski@eu.socionext.com
 <https://www.eu.socionext.com/>

Thank you for listening!

SOCIONEXT™

for better quality of experience