Next-Generation Building Automation Innovation Technology Nessum (IEEE 1901)

Nessum Alliance

AHR Expo 2026

No. NSAD-P0110E-2
Scope of disclosure:
Open to public

About Nessum WIRE

nessum WIRE

Technology to carry information on any cable

Flat Cable

Twisted Pair Wire

coaxial cable

Power Line

Value Provided

Renovate communications without changing wiring

Make your building smarter with Secure, high-speed IP communication

Nessum's Features

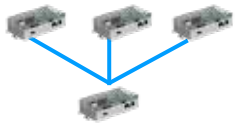
Large Scale Network

Master

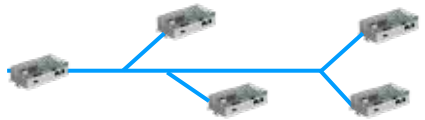
Up to 1024

Terminals

Free Topology

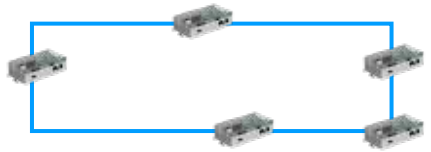


Star



Bus (Multi-drop)

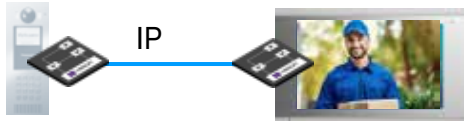
Daisy chain



Ring

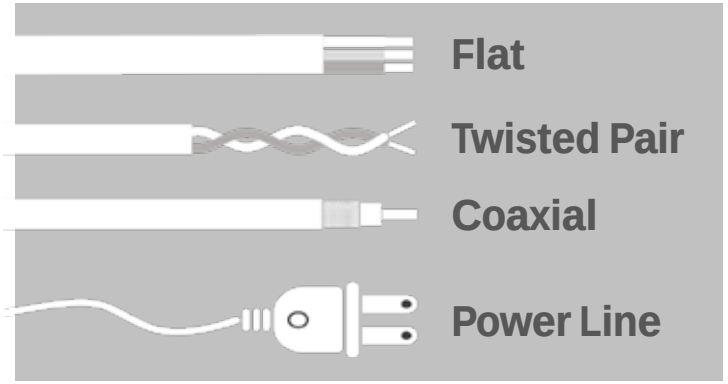
IP Communication

Embedded Nessum LSI



With Existing Wires

Any Wire

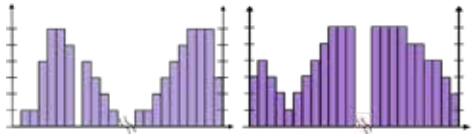


Mbps class communication

Higer Security

AES 128bit Encryption

Max. 7^{432} Modulation Patterns

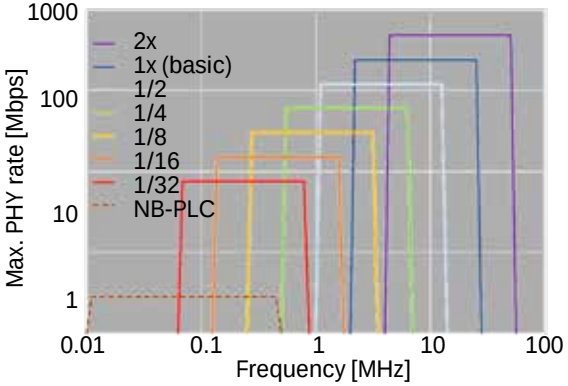


+

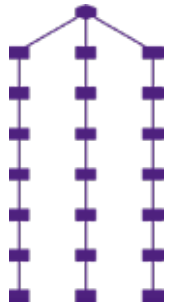
IEEE 802.1x Authentication
(IEEE 1901b)

Long Distance

Flexible Channel



Multi-Hop



Changes in the surrounding environment - topics related to Nessum

From the second half of 2024, DAIKIN launched the latest model equipped with Nessum

Nov. 2024: Released products w/ Nessum

【November 2024】
Released Nessum-equipped air conditioner VRV7 in Japan

●VRV7シリーズの冷媒転換を基点としたDⅣ-NETの適用
DⅣ-NETでは、通信の高速化、データ通信の大容量化を実現するため、通信方式を大きく刷新しました。DⅢ-NETとの互換性は持たず、同一系統の室外と室内ユニットを同時に更新が必要になります。2025年より冷媒R410AからR32へ転換されるVRV7の発売タイミングよりDⅣ-NETの適用を順次拡大していきます。

（ Excerpt from Daikin's website ）

【January 2025】
Launched air conditioners equipped with Nessum communication in North America.

Jul. 2025: Joined the Alliance

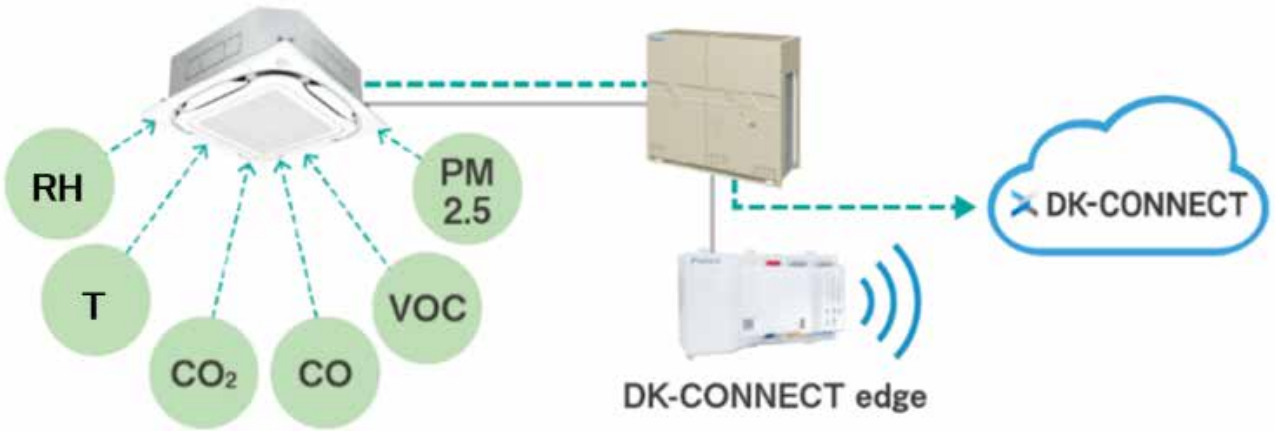
The Reason why DAIKIN adopts Nessum

Improving comfort, security, energy savings, and ease of deployment

Frequent data collection and detailed control require "secure, high-speed stable communication"

With accelerated communication speeds, Nessum enables seamless integration with external sensors, achieving a perfect balance between comfort and energy efficiency.

By utilizing existing wiring for IP communication, it allows for easy remote configuration of device identification labels, streamlining installation processes.



The need for secure, high-speed, and stable communication

The same needs are increasing in fields other than HVAC

The European Cyber Resilience Act (CRA) came into force in December 2024

"High security" and "IP support" of equipment are urgently needed

Commercial AC

Instrumentation

Apartment Intercom

High-security and IP-compatible communication tech that can be introduced with simple construction is desired.

Nessum WIRE Standout Differentiators

- Establishing a secure (data encryption, IEEE 802.1X compliant) network environment
- Improving maintainability and reducing operational load by switching to IP easily
- Improving equipment and system performance by increasing communication speed (from a few Mbps to tens of Mbps)
- Reducing installation costs and shortening of construction period by utilizing existing wiring

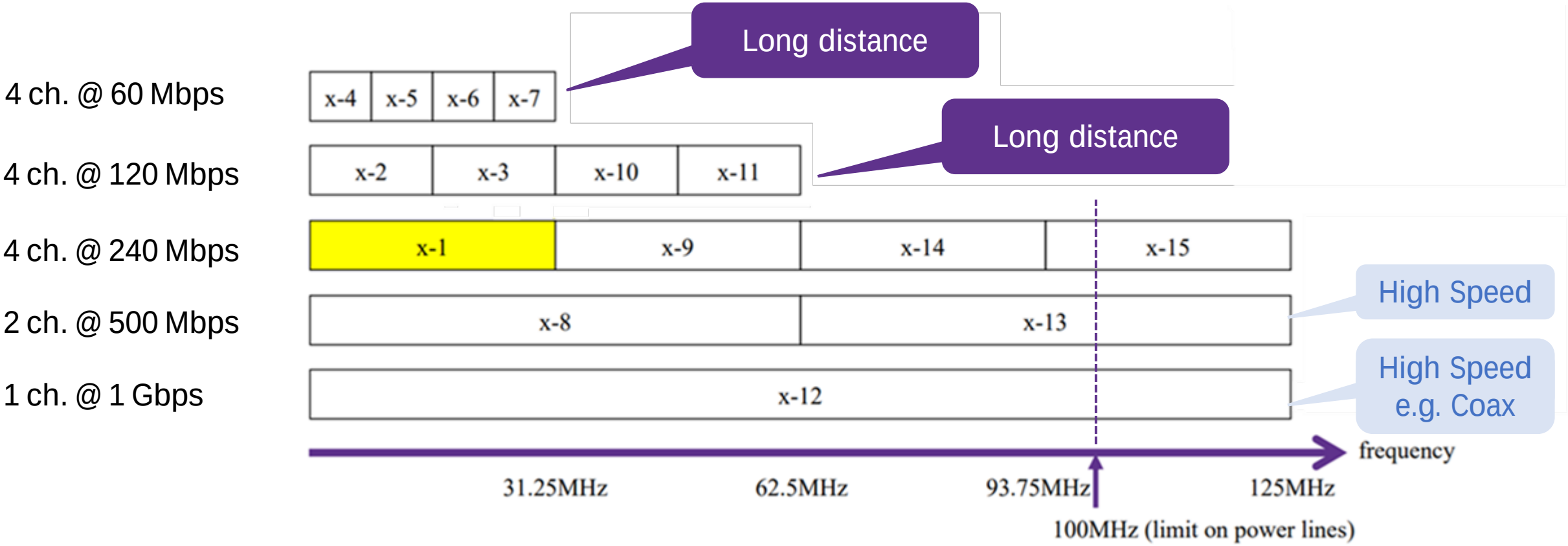
Nessum WIRE vs. 10BASE-T1L vs. 100BASE-T

	Nessum WIRE	10BASE-T1L	(ref) 100BASE-T
Standard	IEEE 1901	IEEE 802.3cg	IEEE 802.3ab
Comm. Speed	Several to tens of Mbps(*)	10 Mbps	100 Mbps
Comm. Distance	Several km(*) (Max. x10 extension with multi-hop)	1,000 m	100 m
Connection	Point-to-Multipoint **(Free Topology / 1,024 nodes)**	Point-to-Point (Star / Daisy chain with dual port devices)	Point-to-Point (Star)
Cable	**Any type of cable (No new wiring)**	SPE cable (Existing cables may be reusable)	**> Cat5 cable**

* Depends on the type of cable and communication environment

High Speed / Long Distance Technology

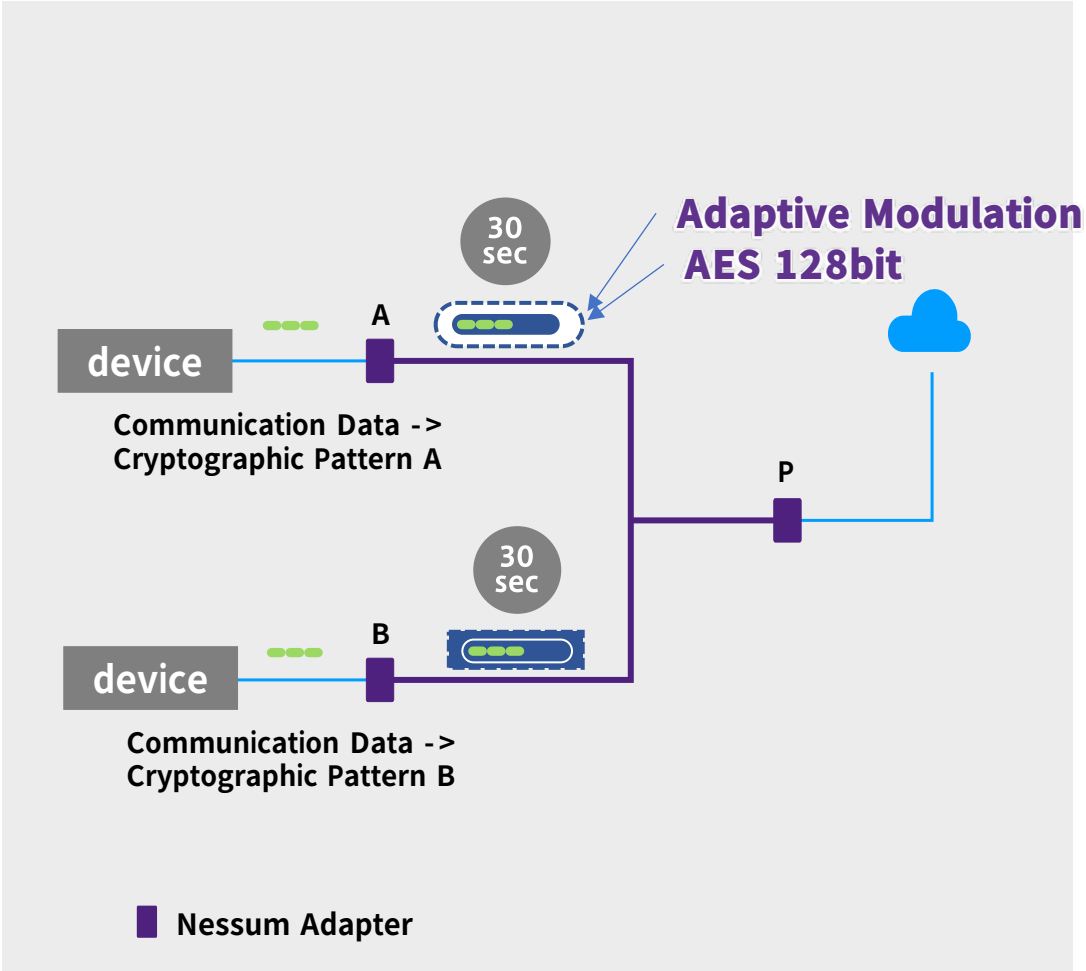
Nessum supports Flexible Channel mode



x-1 Basic channel (2M to 28MHz)

Stronger Nessum Security Technology

Two main types of encryption methods for more secure communication

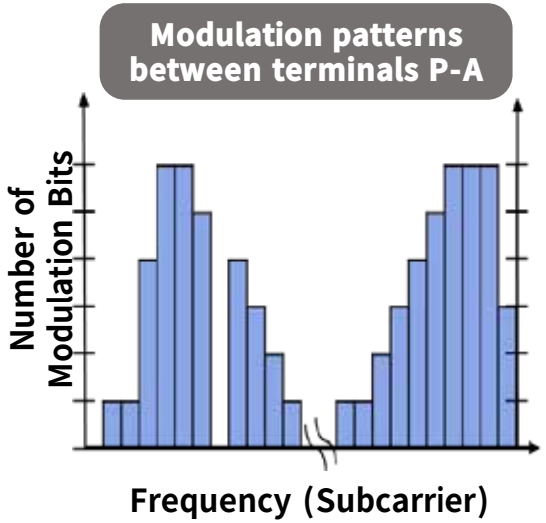


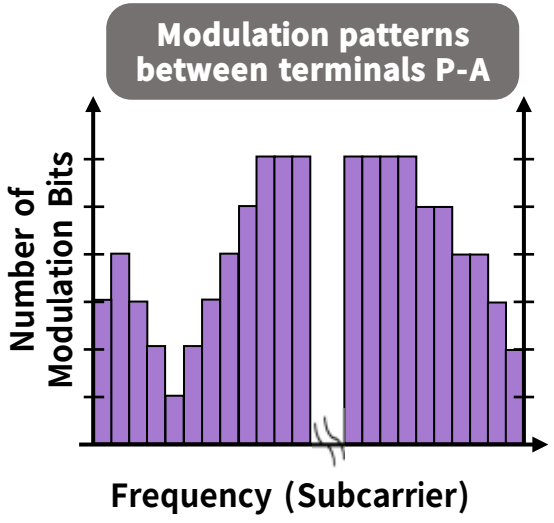
・AES 128bit

A cryptographic method that is widely used today. There are 2^{128} patterns, so it is said that there is no practical method of attack at this time.

・Adaptive Modulation

A modulation pattern that changes between terminals to match the frequency characteristics of different transmission lines between terminals. There are up to 7^{432} patterns, and they are updated every 30 seconds, so it is extremely difficult to eavesdrop.

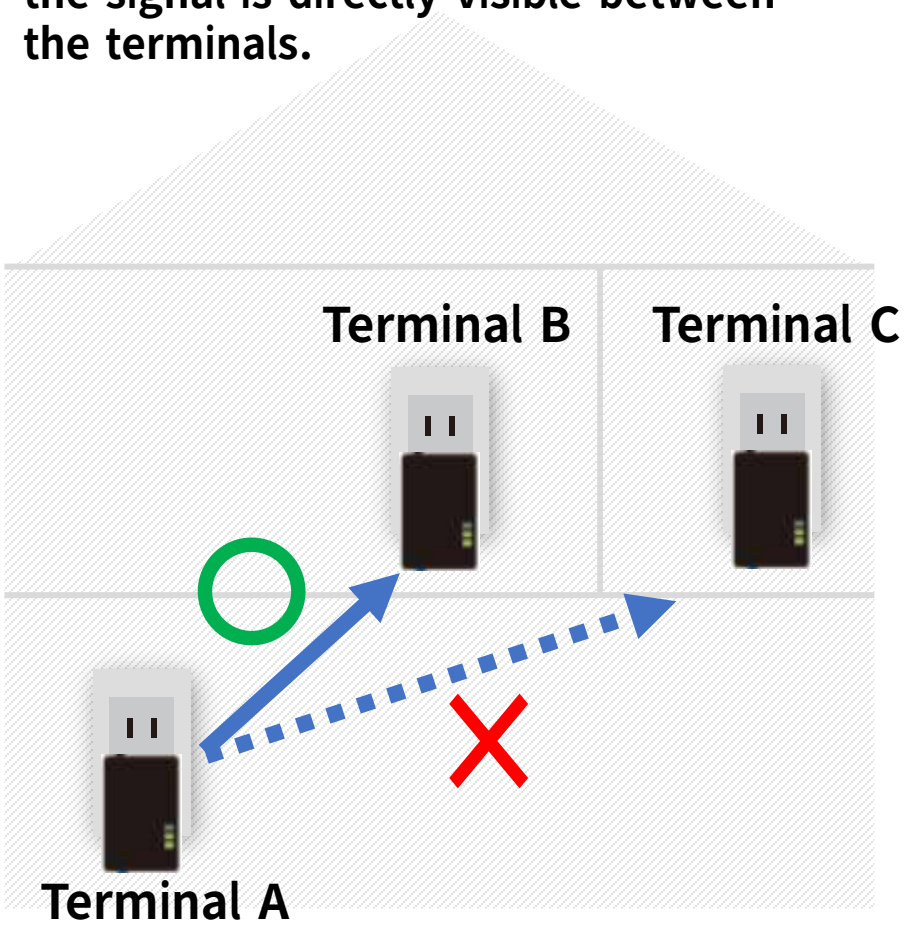




Multi-hop enables long-distance communication of several km

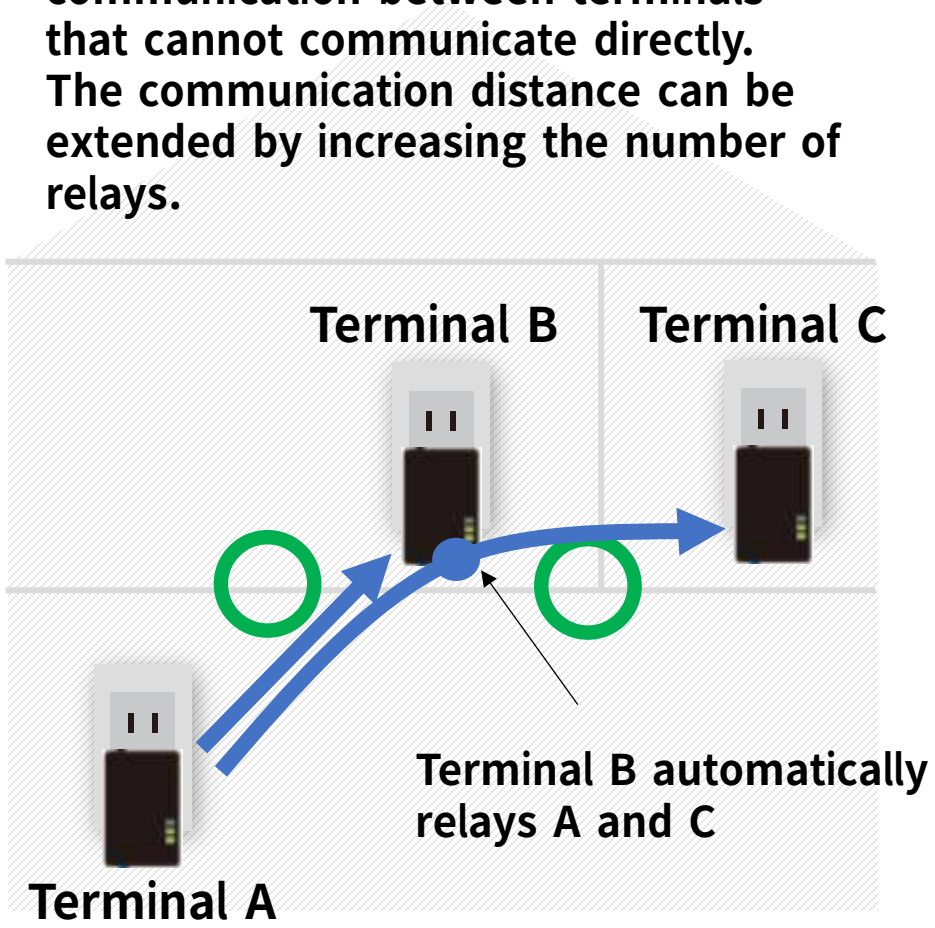
No multi-hop

Communication is possible only when the signal is directly visible between the terminals.



With multi-hop

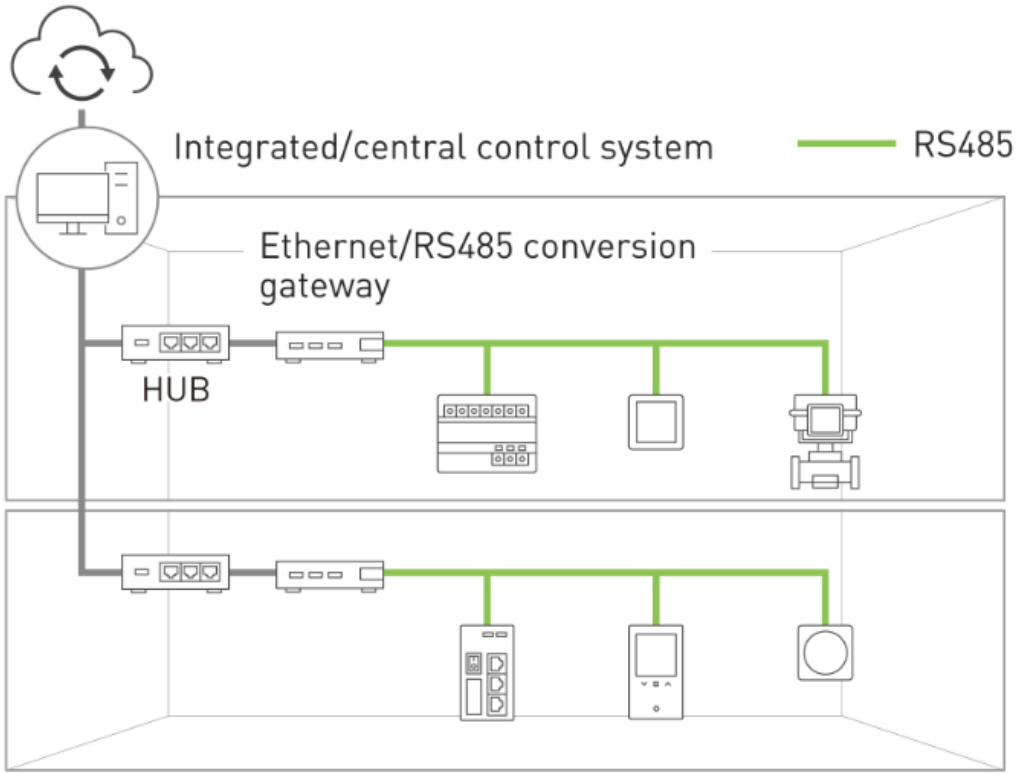
The automatic relay function allows communication between terminals that cannot communicate directly. The communication distance can be extended by increasing the number of relays.



Ex.1: IP conversion of existing wire network – Ethernet

Before

Existing 2-wire cable system [non-IP]

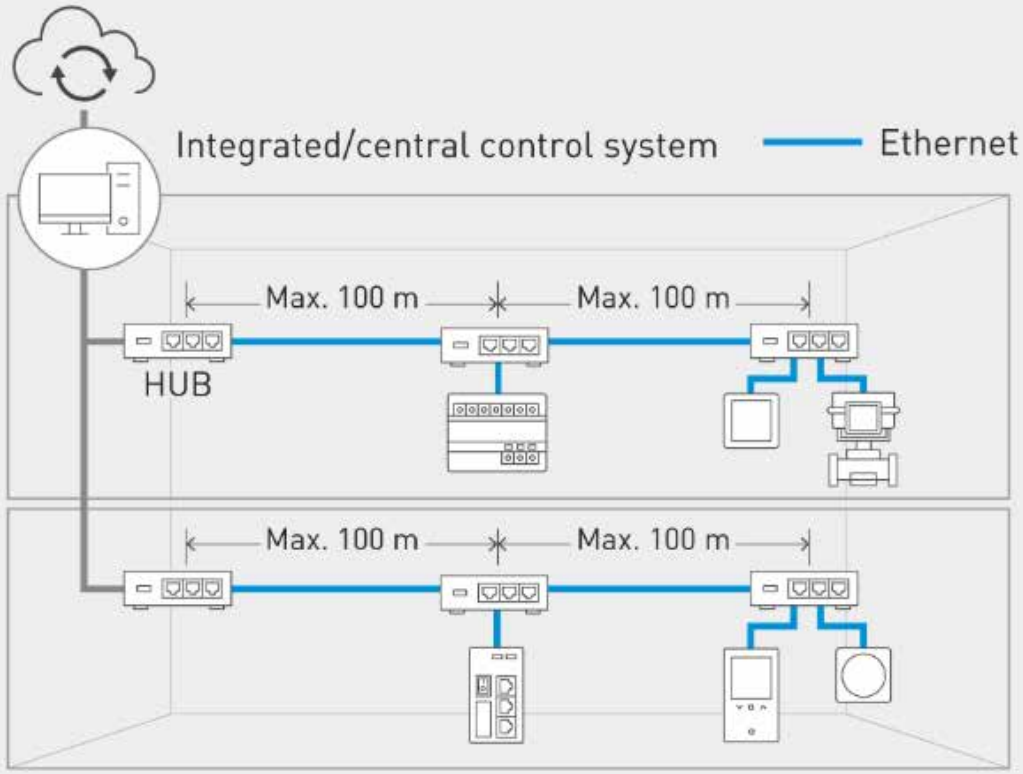


For 10BASE-T1L

Since it does not support **bus-type connections**, hubs are required at the junctions, and the cable is an SPE cable, but it is wired like Ethernet

After

IP with Ethernet

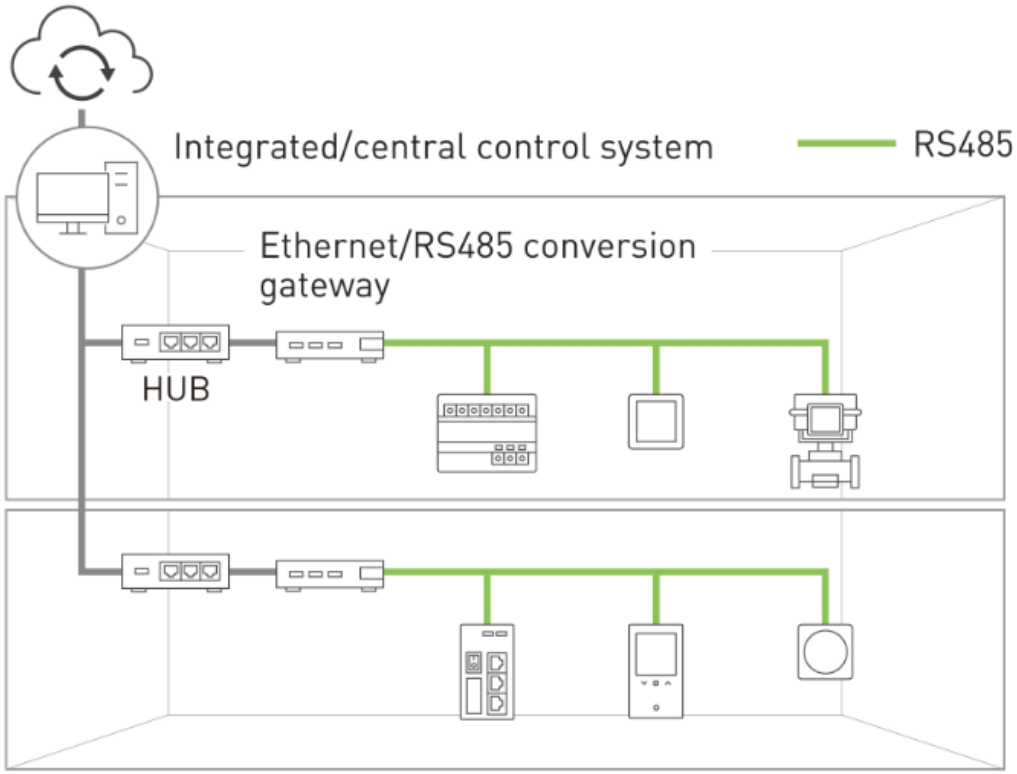


- Replacing 2-wire cables with Ethernet cables
- Switching hub required every 100 meters
- Length of wiring is longer due to constraints of star wiring

Ex.1: IP conversion of existing wire network – Nessum

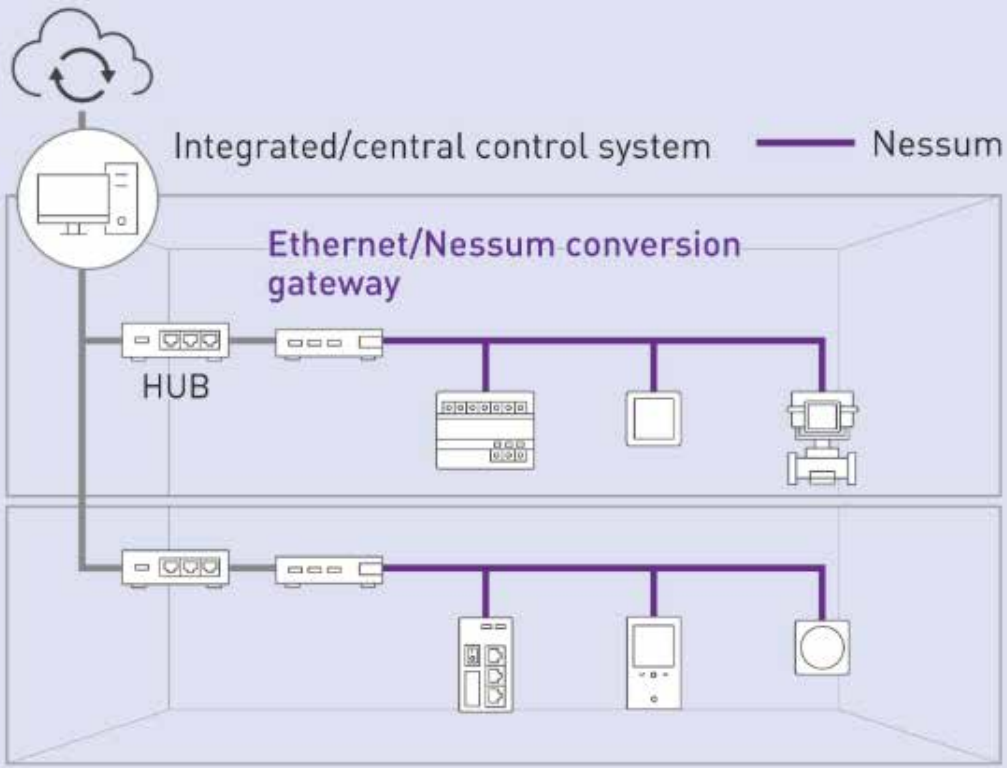
Before

Existing 2-wire cable system [non-IP]



After

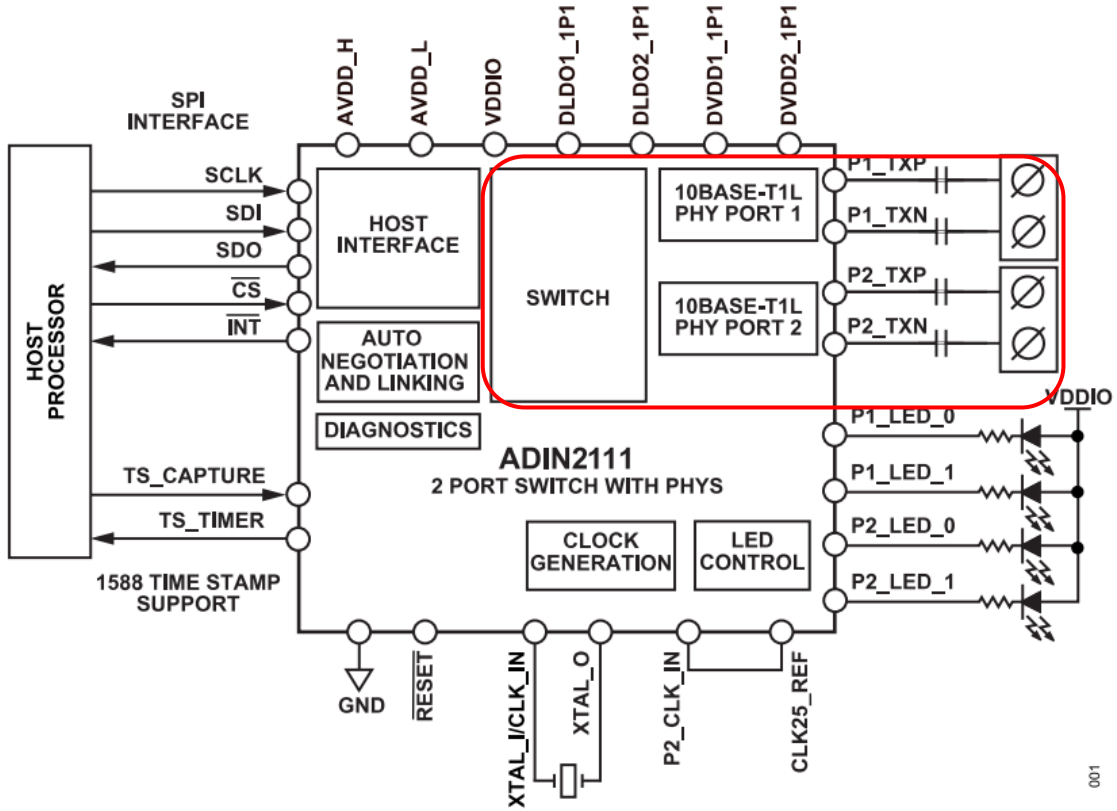
IP with Nessum



- **Reuse the 2-wire cable as it is (no need to re-install wires)**
- **Multi-hop tech allows comm. over long distances w/o worrying**
- **Just connect the terminal w/o worrying about the wiring topology.**

Ex.1: IP conversion of existing wire network – 10BASE-T1L

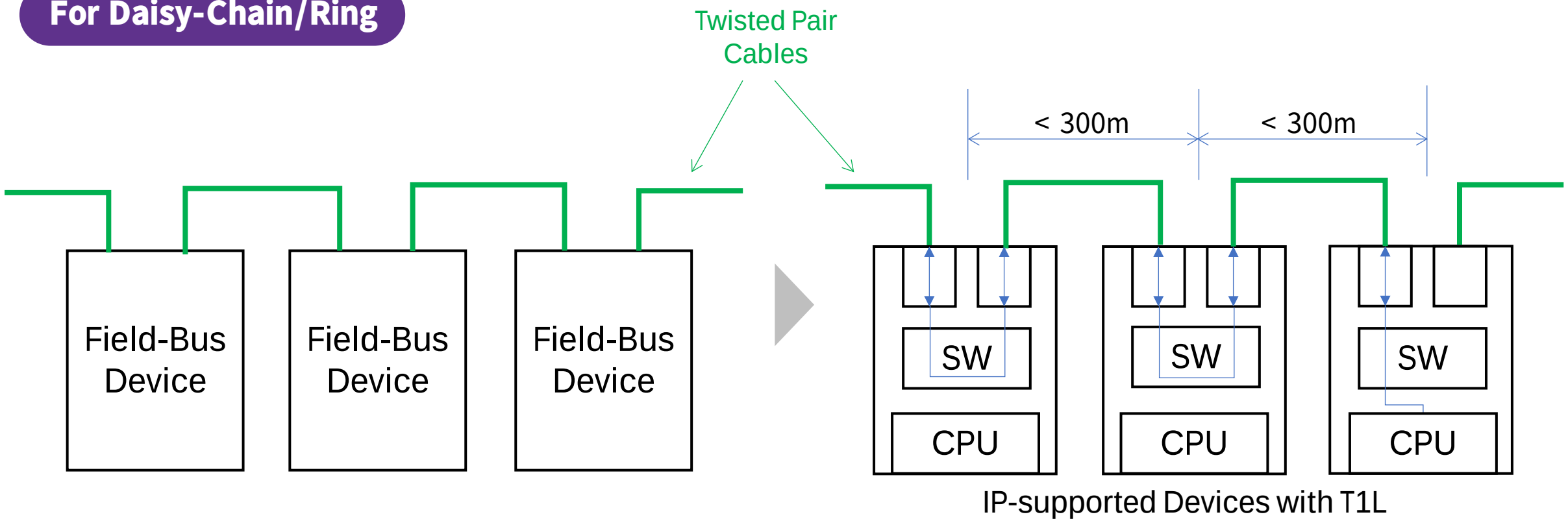
Manufacture IP devices with T1L using the dedicated chip



2-Port Ethernet Switch with Integrated 10BASE-T1L PHYs

Ex.2: IP conversion of existing wire network – 10BASE-T1L

For Daisy-Chain/Ring



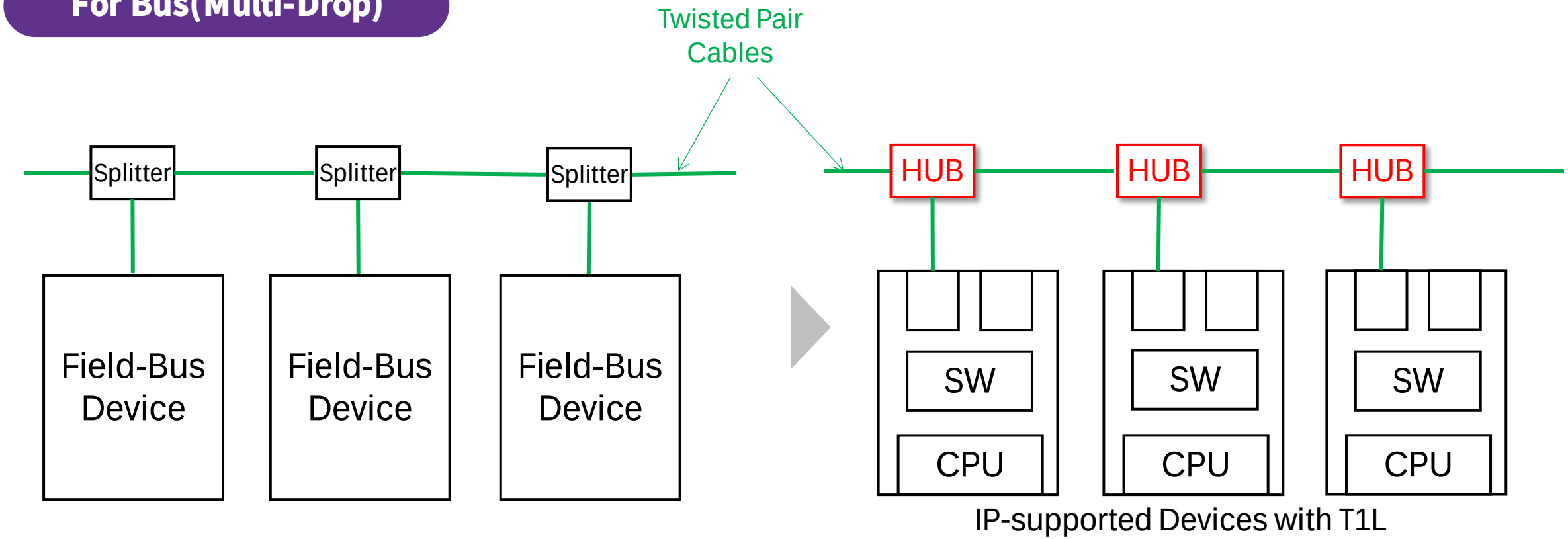
Existing cables can be used as-is

(However, there are restrictions on the distance between devices)

Supports daisy-chain (+ring) topology

Ex.2: IP conversion of existing wire network – 10BASE-T1L

For Bus(Multi-Drop)



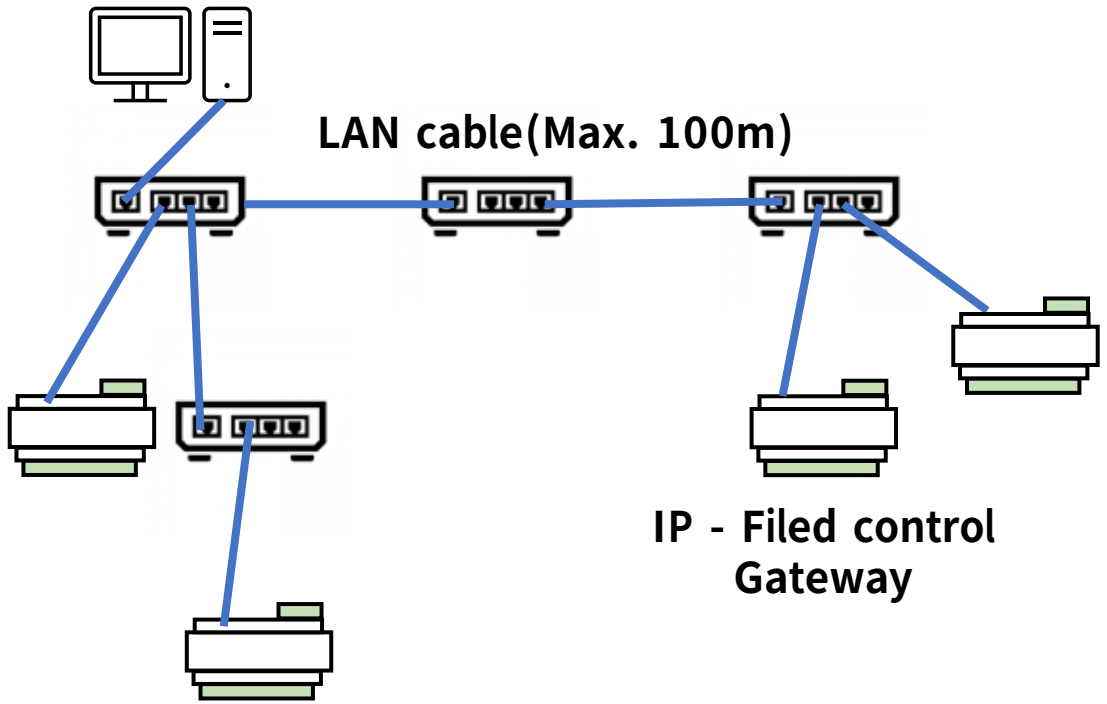
Existing cables can be used as-is,
but splitters must be replaced with HUBs

Basically, not support Bus(Multi-Drop) topology

Ex.2 IP Network installation for new facility construction

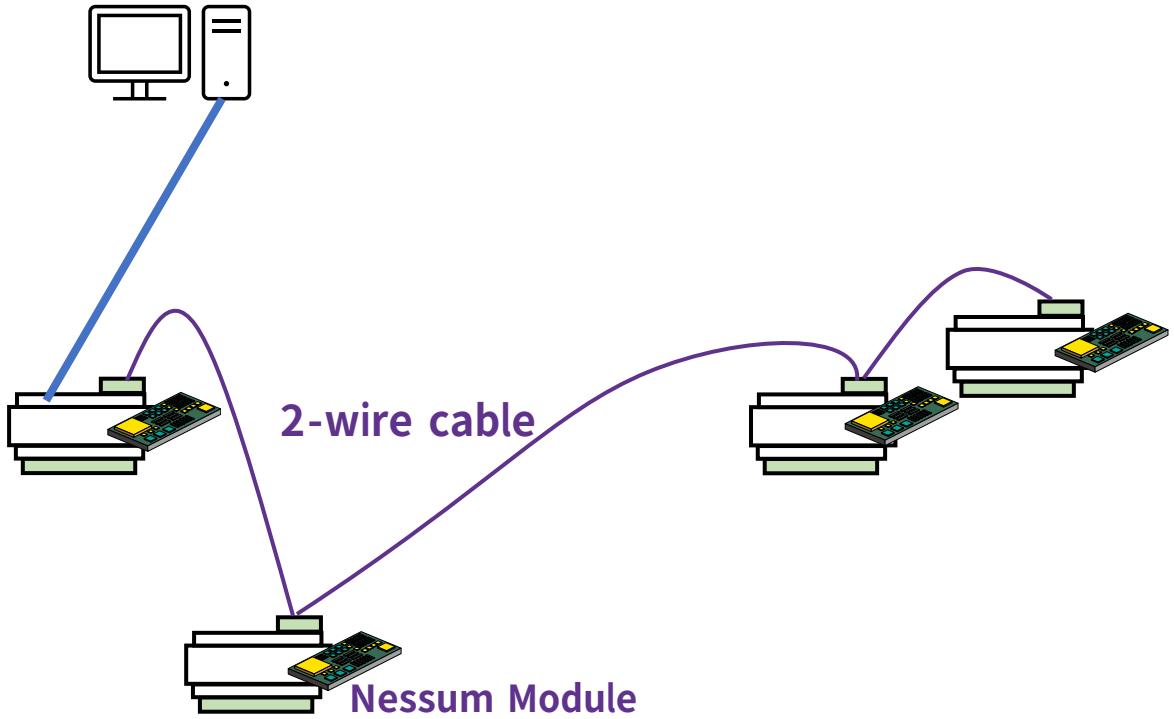
For Ethernet

Laying LAN cables requires cable costs, HUBs and wiring man-hours.



For Nessum

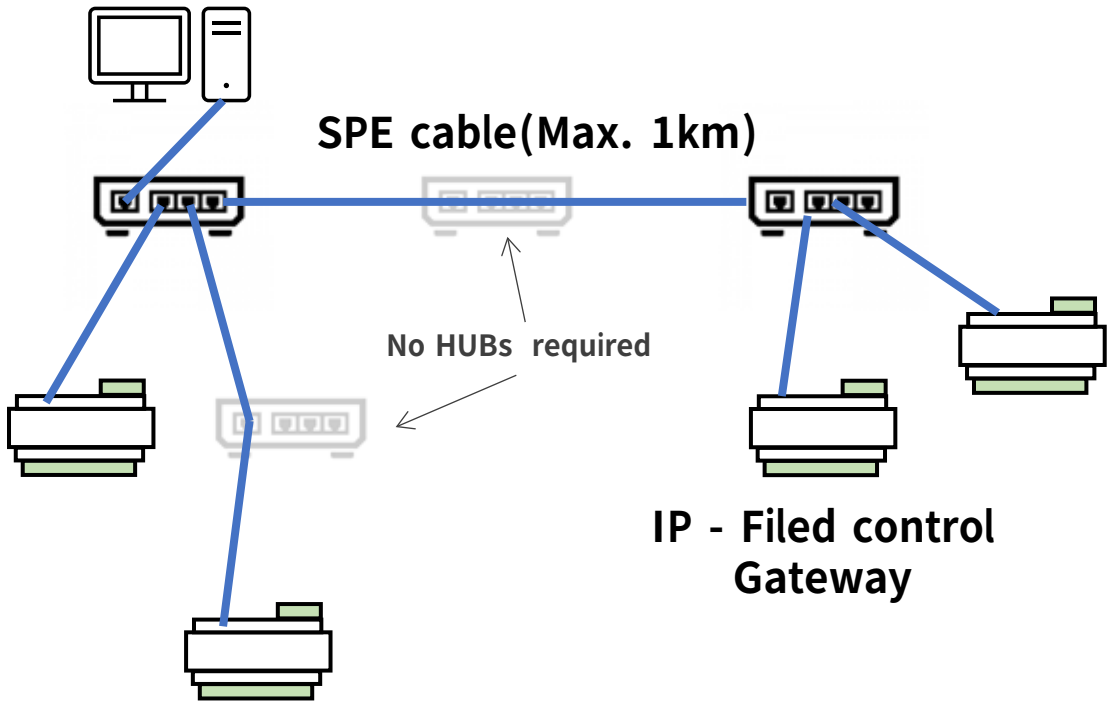
By adopting Nessum-embedded equipment, you can easily build new networks with free topology connections and long-distance communications.
The wiring length can be kept short during installation, leading to cost savings.



Ex.3 IP Network installation for new facility construction

For T1L

Since it does not support bus-type connections, hubs are required at the junctions, and the cable is an SPE cable, but it is wired like Ethernet



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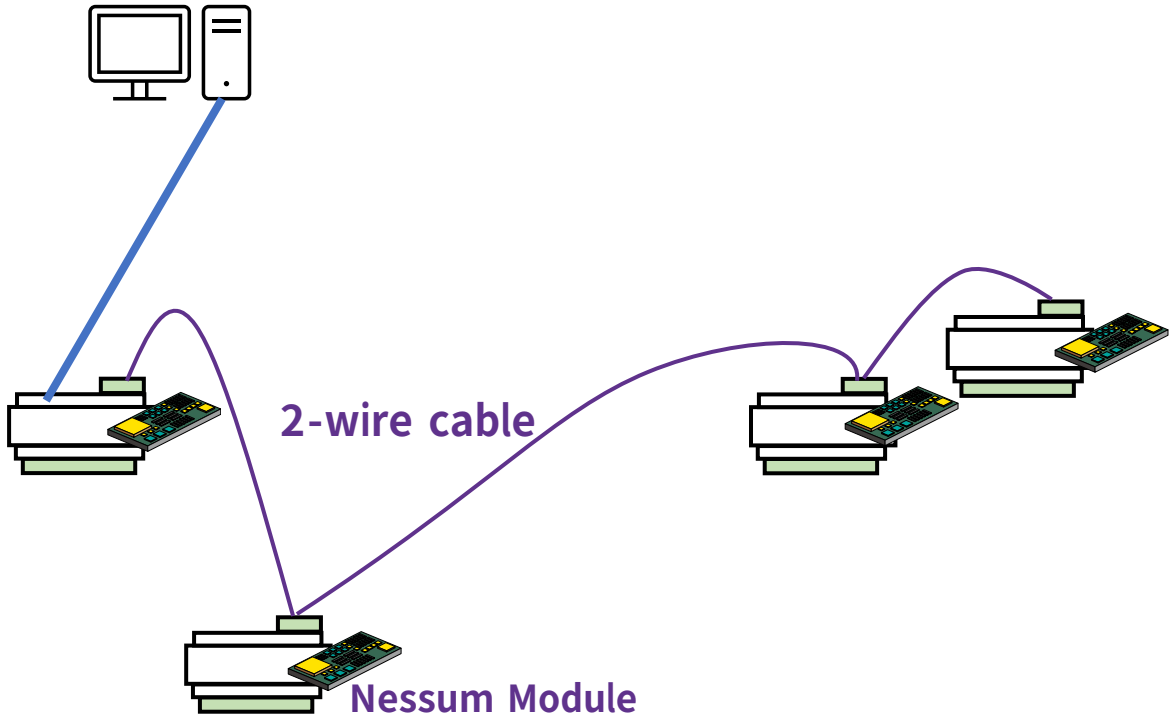

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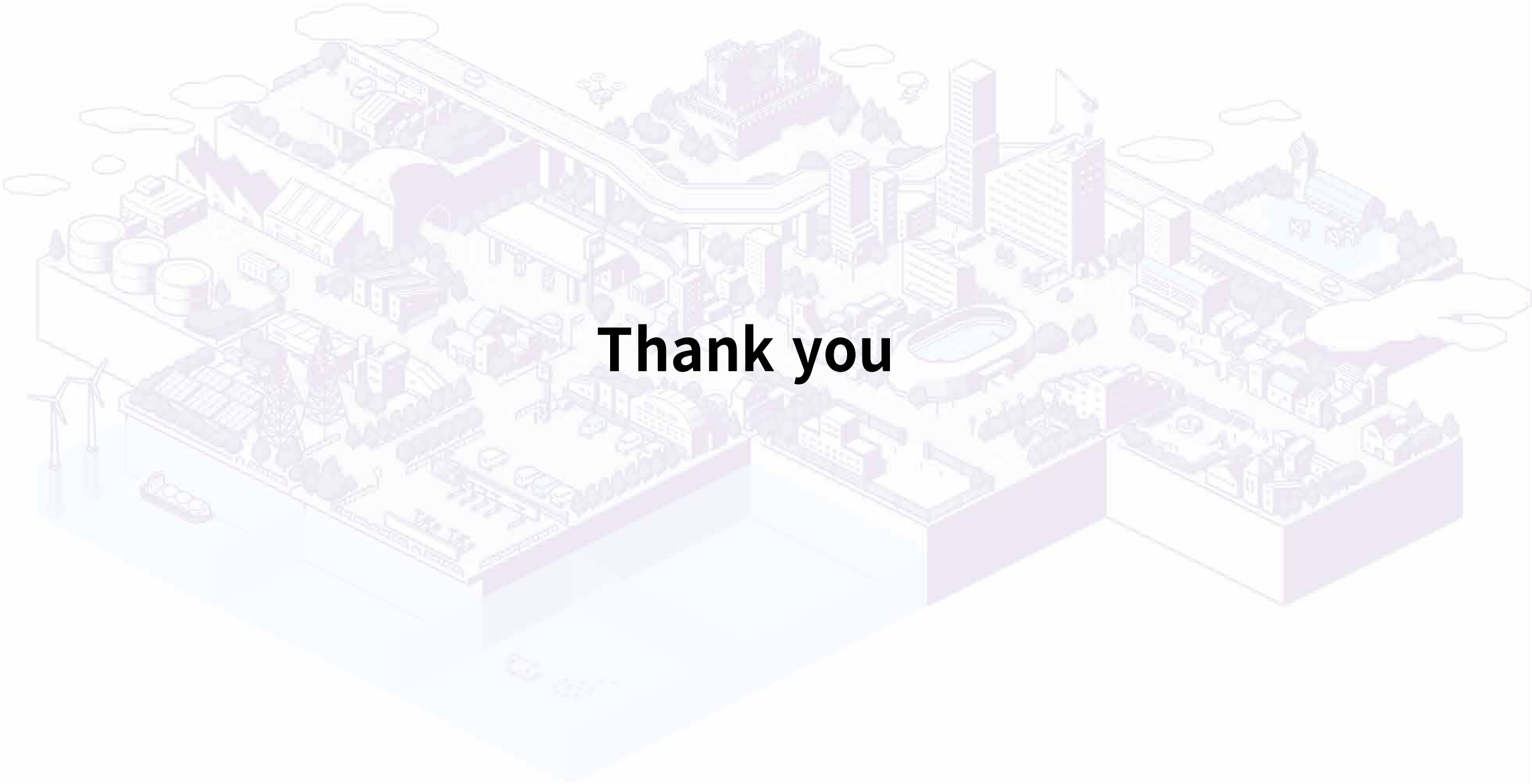
Takeaways

- **Nessum** is technology to carry information **on any cable**
- **Nessum** has **6** main key feature

Large Scale Network	**Free Topology**	**IP Communication**
Any Wire	**Higer Security**	**Long Distance**

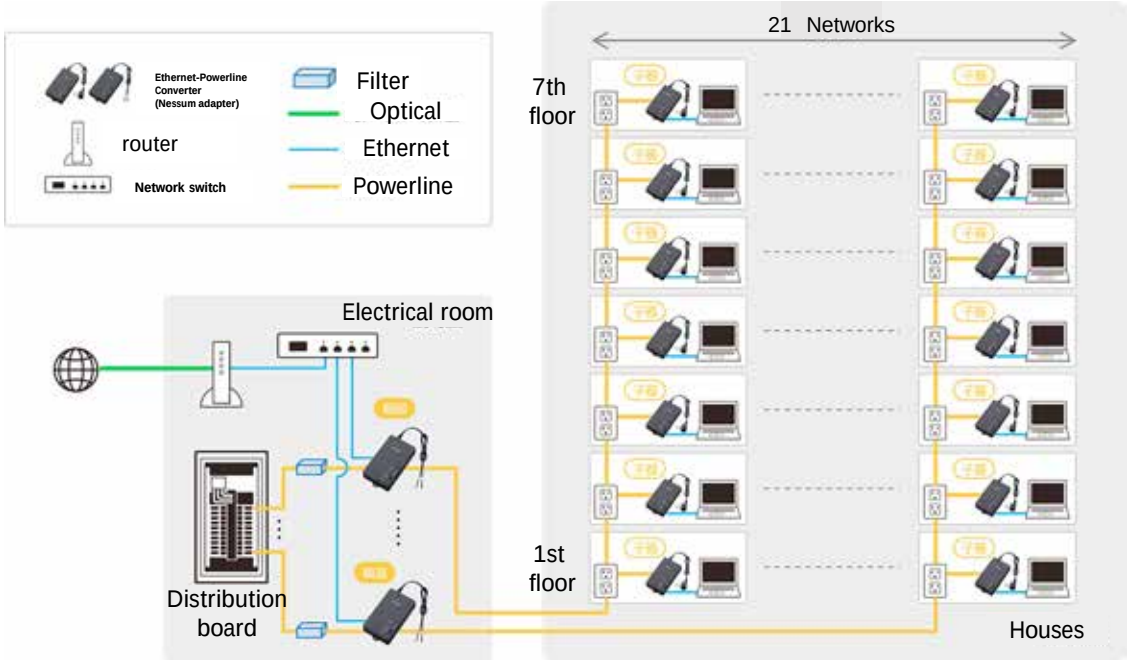
- **Nessum** already has been adopted by **DAIKIN** for their products
- **Nessum** is the only communication technology that supports both **free-topology** connections and **any types of cables**



Thank you

Low-cost network construction (Power Line)

International residence Higashiyama - Google Maps



Nessum divides comm. speed based on the number of connected devices. For 137 houses, it's 146kbps per house. This is insufficient for remote classes, so filters are added to split each system, achieving 2.8Mbps per house. If high speed is not needed, filter costs can be reduced.

<Background>

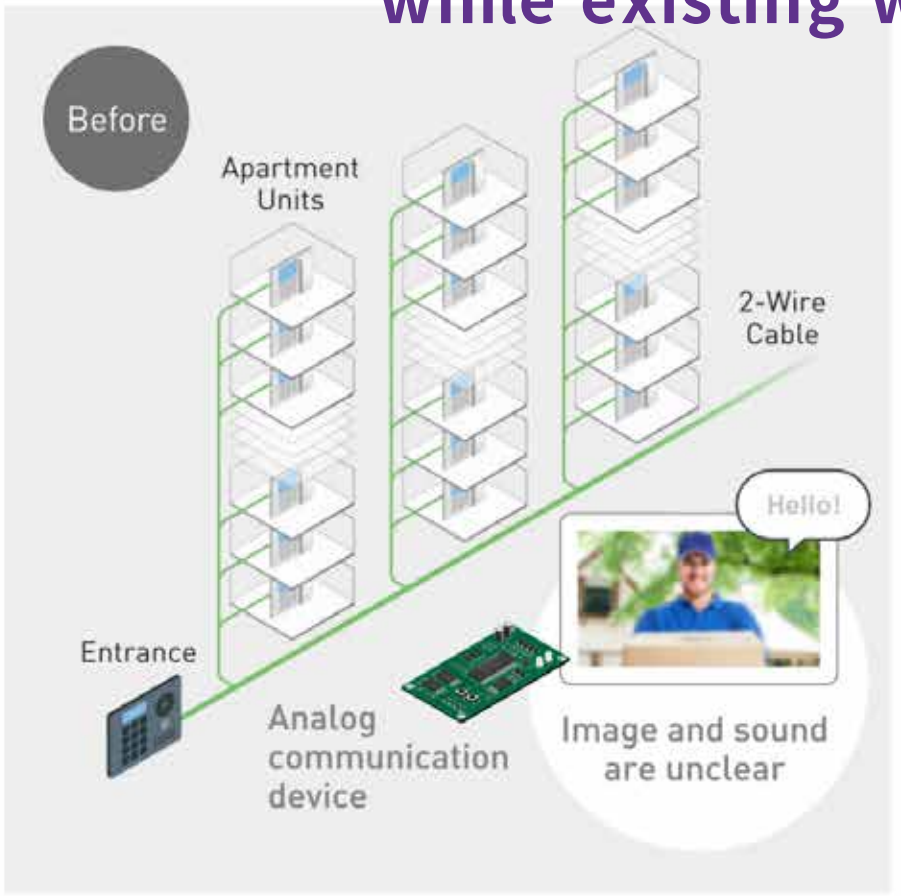
Customer Request	In COVID19 situation, they would like to introduce an Internet connection to each house as soon as possible for remote classes.
Building	7 floors 137 houses

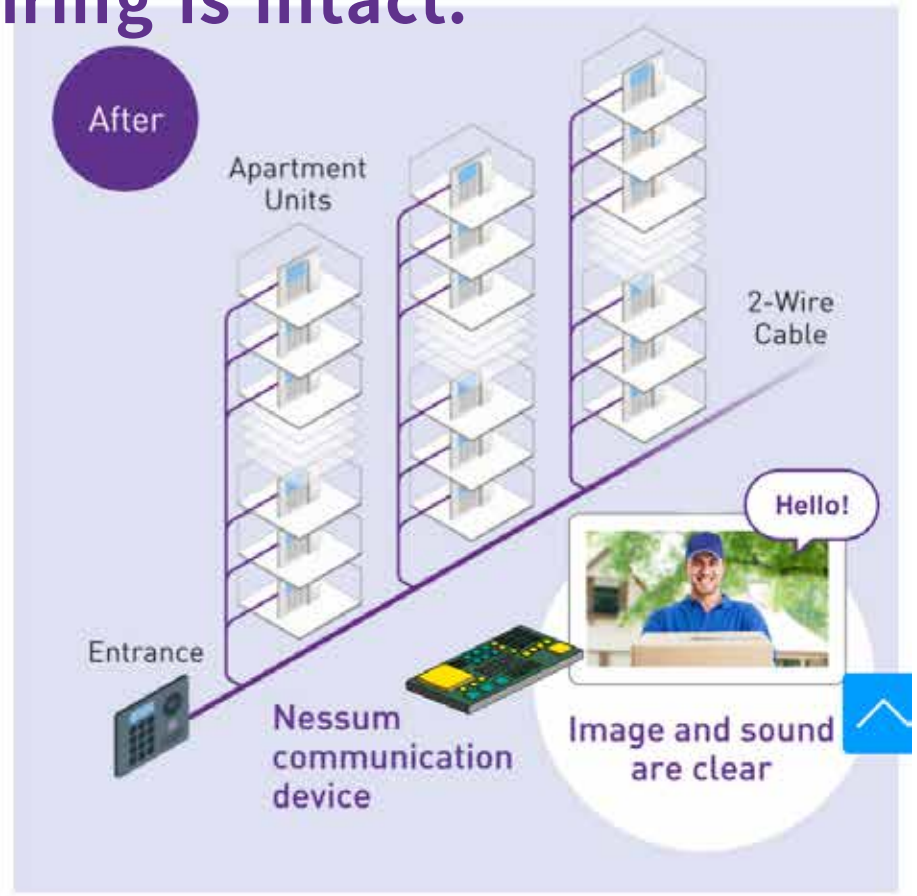
Total cost was reduced by 60% compared to Ethernet

	All Ethernet	Nessum WIRE
Total cost	96,300 USD	38,500 USD
Const. period	20 days	3 days
Details	-	- Nessum Adapter: $25,600($161 x 159 unit) - Other devices : $4,400* - Installation : $8,500

Ex.3 Renewal of intercom in an apartment (using existing wiring)

High-quality communication and secure IP support are possible while existing wiring is intact.





For 1000BASE-T Communication is difficult unless it is a dedicated Ethernet cable. The wiring itself needs to be renewed, and it cannot be built as it is.

For 10BASE-T1L Since it does not support bus-type connections, it is necessary to add a HUB to the junction and cannot be built as it is.