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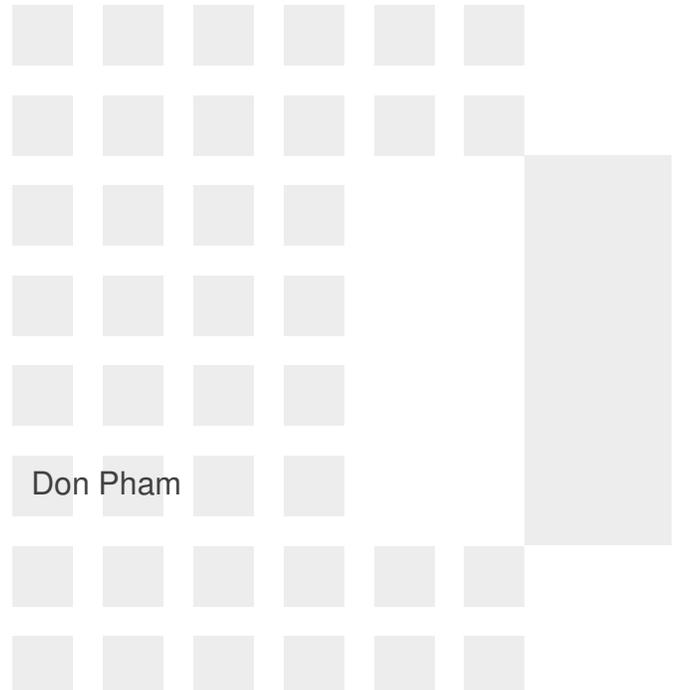*Think Automation and beyond...*

FC6A Plus EtherNet/IP™
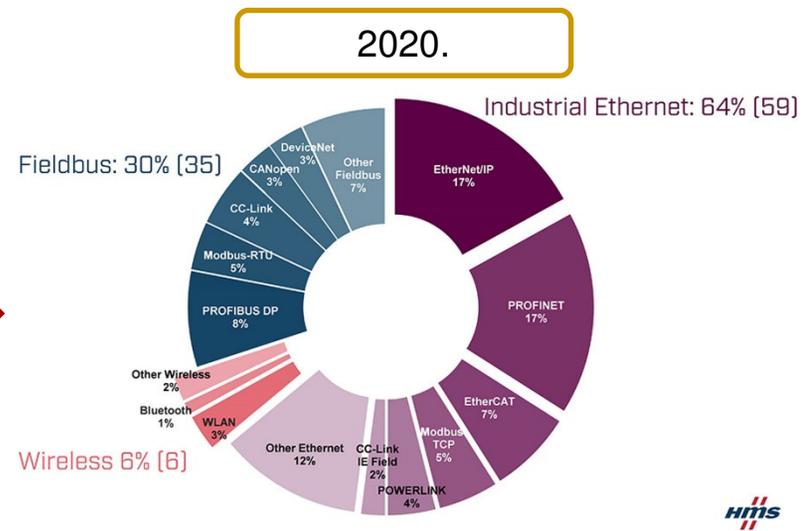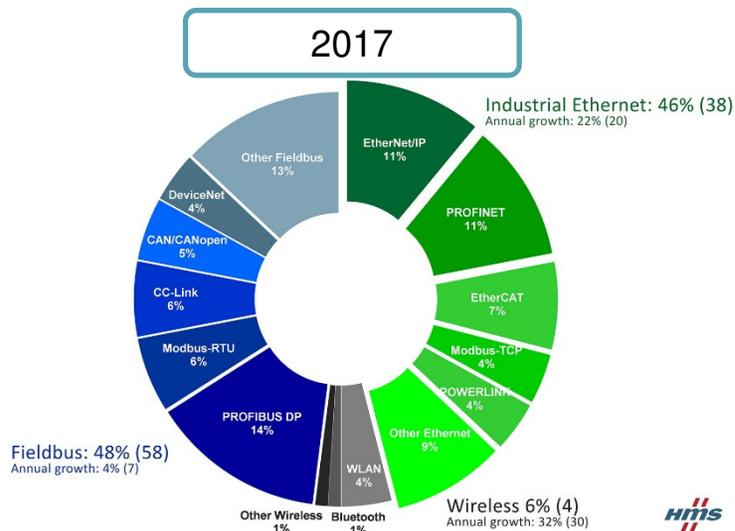
Don Pham

What is EtherNet/IP

- EtherNet/IP - Ethernet Industrial Protocol

- EtherNet/IP is an industrial network protocol that adapts the Common Industrial Protocol (CIP)

- The EtherNet/IP and CIP technologies are managed by ODVA, Inc.

- The leading industrial protocols in the US with more than 30% market share

- EtherNet/IP makes use of TCP for explicit messaging and UDP for implicit messaging (FC6A supports both)

- Allows the FC6A to exchange I/O and data to other devices that support EtherNet/IP

EtherNet/IP™

Worldwide market share 2017 vs 2020

		2017	2020
Fieldbus	Non-Ethernet networks such as Modbus RTU, Devicenet, Profibus, etc…	48%	30%
Industrial Ethernet	Ethernet networks such as Modbus TCP, Profinet, EtherCAT, EtherNet/IP	46%	**64%**
EtherNet/IP	New devices now equip with EtherNet/IP	11%	**17%**
Wireless	Bluetooth and other wireless	6%	6%

https://www.hms-networks.com/ja/news-and-insights/news-from-hms/2020/05/29/industrial-network-market-shares-2020-according-to-hms-networks

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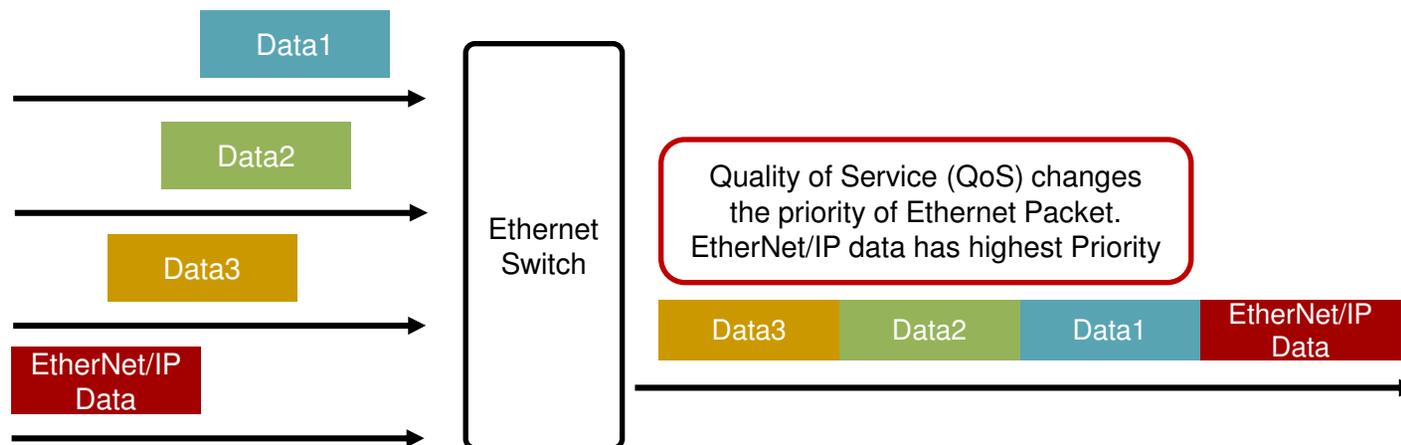
EtherNet/IP™

Advantages of EtherNet/IP

- Real-time controls is possible, even when configured with other networks

- EtherNet/IP data can be prioritized when used with QoS (quality of services) industrial Ethernet switch
  - New 8port supports QoS later this year

- Modbus TCP is not suitable for real-time controls because its real-time communication is not guaranteed

Features and Benefits

- ✓ 10/100BaseT(X) (RJ45 connector)
- ✓ Compact size for easy installation
- ✓ QoS supported to process critical data in heavy traffic
- ✓ IP40-rated metal housing
- ✓ -40 to 75°C wide operating temperature range (-T models)
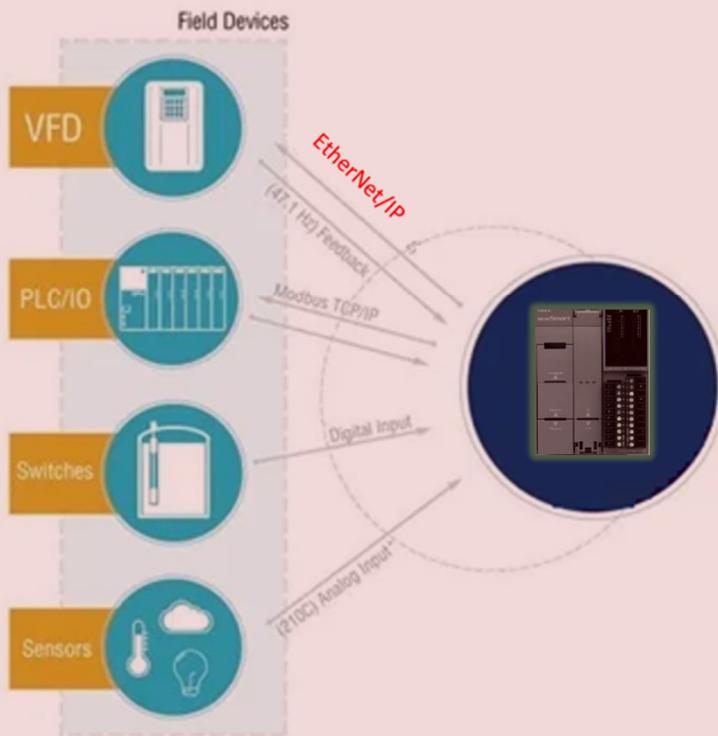
Data1

Data2

Data3

EtherNet/IP Data

Ethernet Switch

Quality of Service (QoS) changes the priority of Ethernet Packet. EtherNet/IP data has highest Priority

| Data3 | Data2 | Data1 | EtherNet/IP Data |

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EtherNet/IP™and MQTT

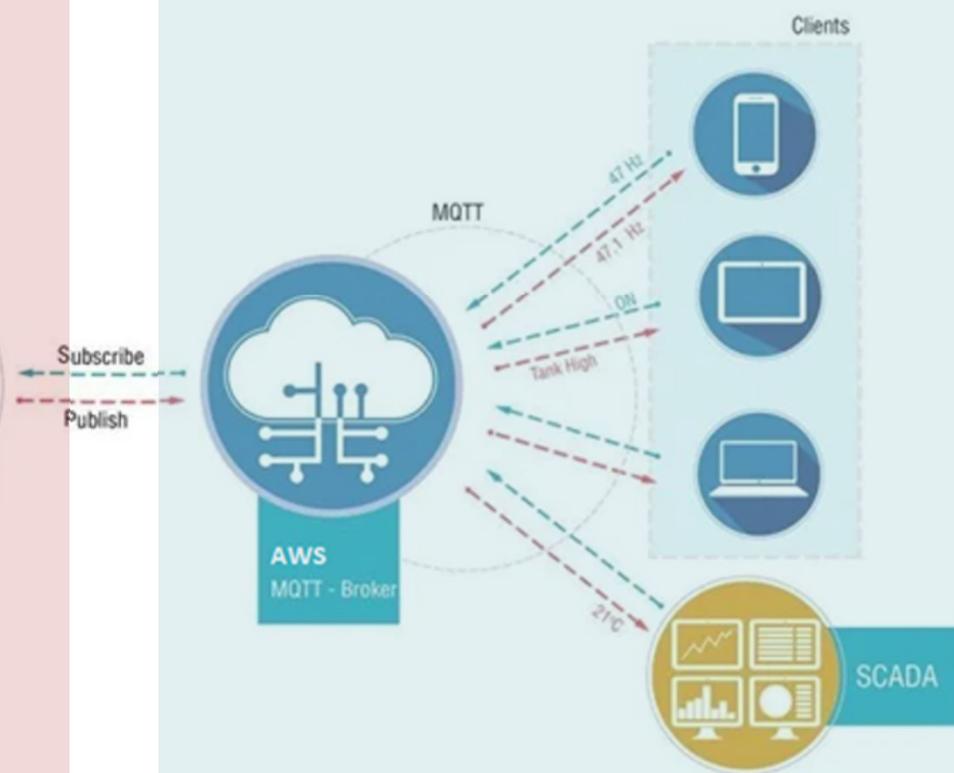**Industrial Protocols**

Modbus TCP   CAN J1939
EtherNet/IP   BACnet/IP

IIoT Protocol

MQTT

EtherNet/IP™

How EtherNet/IP Works

- An EtherNet/IP device can be a Scanner or Adapter
  - **Scanner**
    - A master device on the network
  - **Adapter**
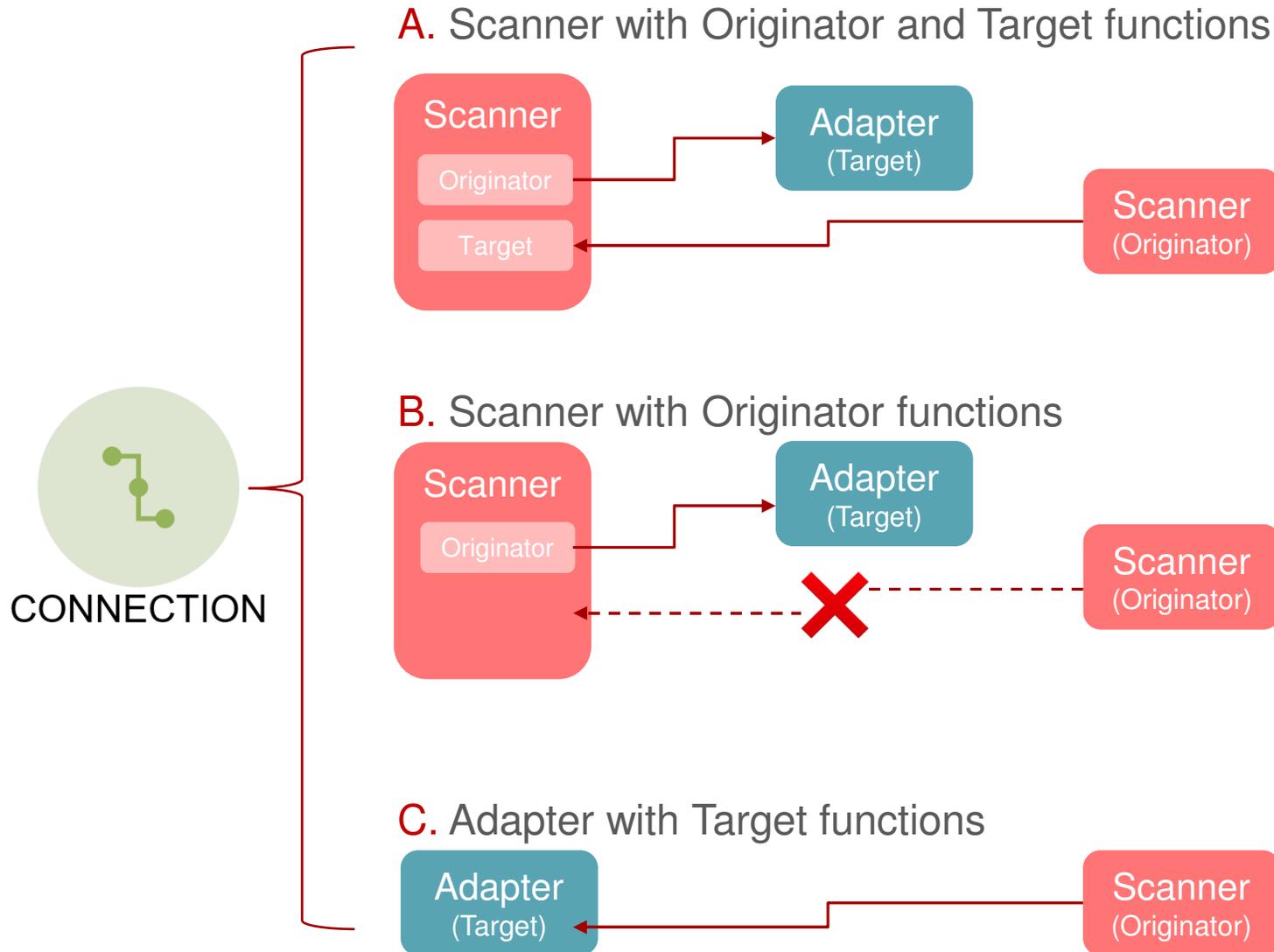   - A slave device on the network

- Furthermore, a scanner or adapter have roles as Originator and Target
  - **Originator**
    - Has the ability to request and connect to the Target
    - Feature can only be found in Scanner device
  - **Target**
    - Waiting for the Originator to connect
    - Feature can be found in Adapter or Scanner device
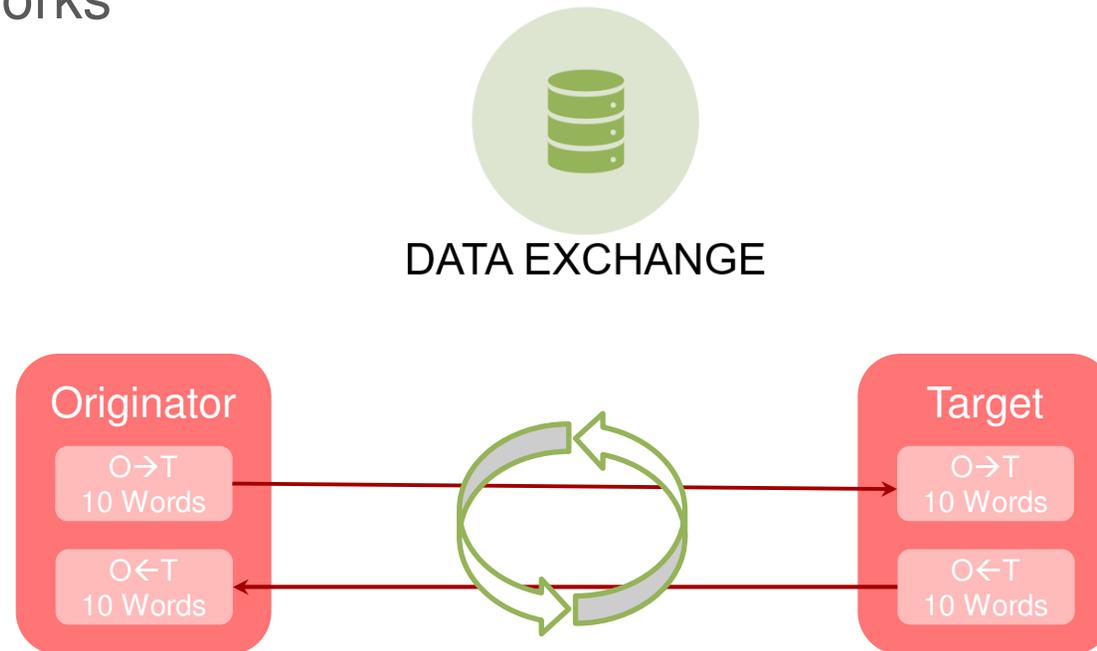
EtherNet/IP™

Scanner and Adapter

■ An EtherNet/IP device can be categorized as:

A. Scanner with Originator and Target functions

B. Scanner with Originator functions

C. Adapter with Target functions

	Originator	Target
Scanner	Available	Optional
Adapter	-	Available

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EtherNet/IP™

How It Works

A. Scanner with Originator and Target functions

| Scanner | | Adapter (Target) | | Scanner (Originator) |

Scanner
- Originator
- Target

Adapter (Target)

Scanner (Originator)

B. Scanner with Originator functions

Scanner
- Originator

Adapter (Target)

Scanner (Originator)

C. Adapter with Target functions

Adapter (Target)

Scanner (Originator)

CONNECTION

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How It Works

DATA EXCHANGE

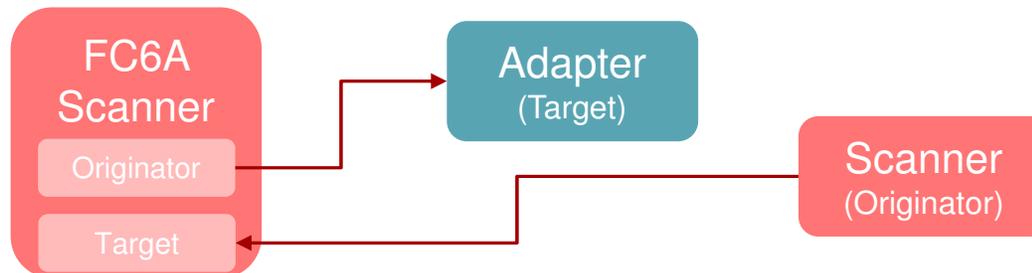| Originator		Target
O→T 10 Words		O→T 10 Words
O←T 10 Words		O←T 10 Words

- The Originator/Target copies the data periodically in a cycle known as Requested Package Interval (RPI, 10-10,000ms) through implicit messaging

- For example
  - RPI = 50ms
  - 10 Words of data from Originator copies to Target every 50ms
  - 10 Words of data from Target copies to Originator every 50ms

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EtherNet/IP™

How EtherNet/IP is supported

- EtherNet/IP is supported on ethernet port 2 of the FC6A Plus CPU (FC6A-D%)

- FC6A Plus supports EtherNet/IP Scanner with Originator and Target functions
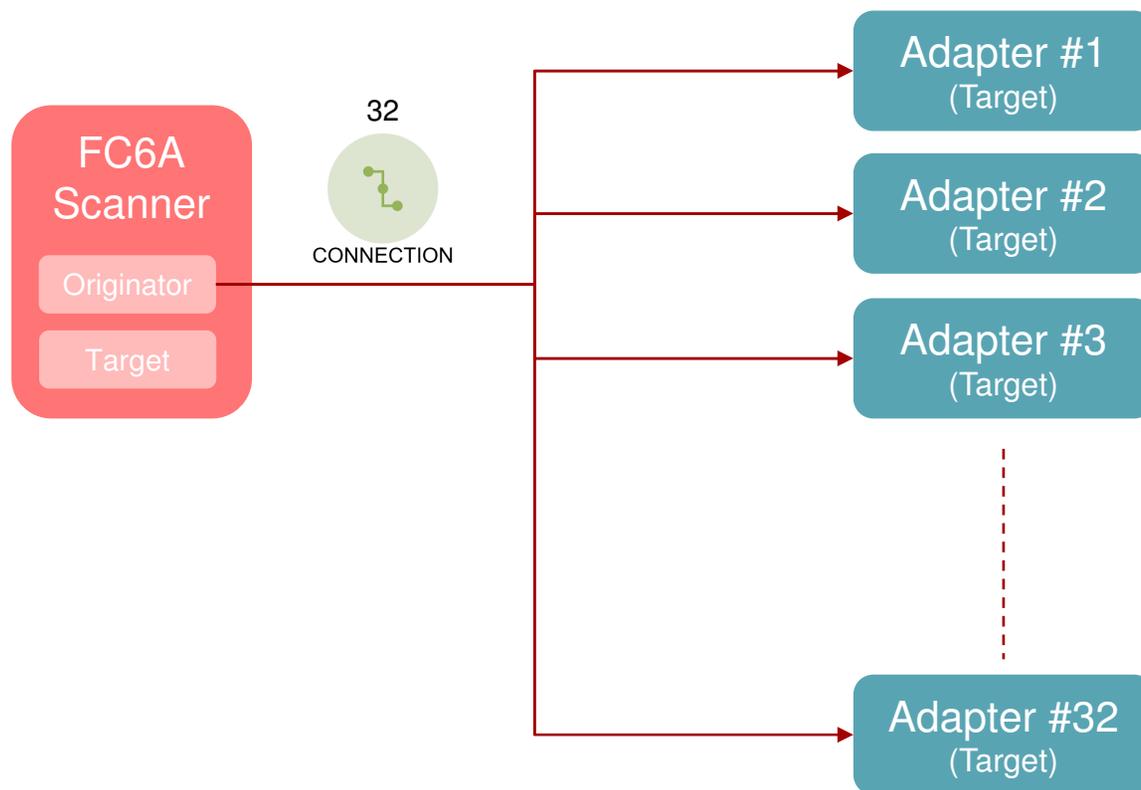
   A. Scanner with Originator and Target functions

FC6A Scanner		Adapter (Target)	Scanner (Originator)
Originator			
Target			

- Available as firmware upgrade (No cost, No hardware)

- Available in AO version 3.19.0 or later (WindLDR 8.15.0)

EtherNet/IP™

Scanner as Originator

■ Maximum number of connections is 32

Scanner as Target

■ Maximum number of connection points is 8