ctrlX SAFETY

How to determine which SAFEX safe data exchange should be used

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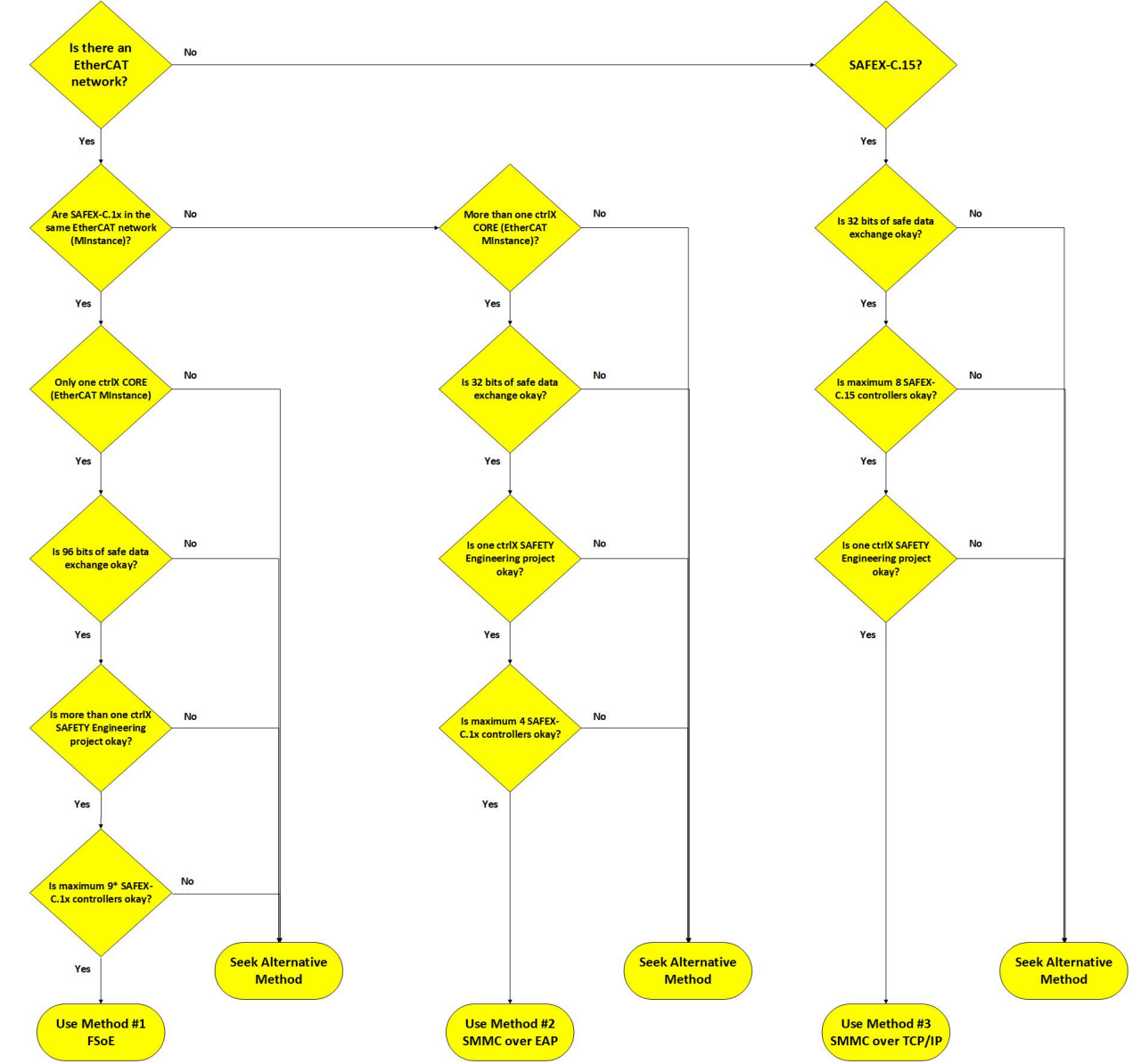
How to determine which SAFEX safe data exchange should be used Things to consider

- Is there an EtherCAT network?
- Are SAFEX-C.1x controls in the same EtherCAT network or different EtherCAT networks?
- More than one ctrlX CORE?
- SAFEX-C.12 or SAFEX-C.15?
- Number of SAFEX-C.1x controllers?
- Amount of safe data exchange needed?
- Project management, one or more than one ctrlX SAFETY Engineering projects?



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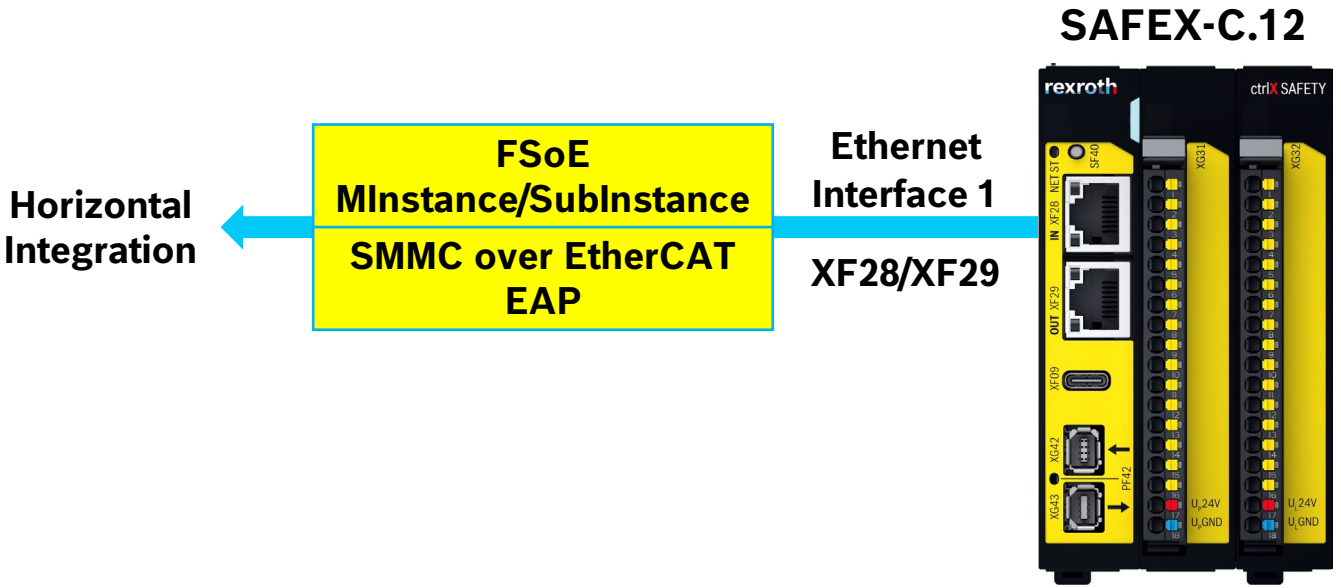
How to determine which SAFEX safe data exchange should be used
SAFEX-C.12-to-SAFEX-C.12 two safe data exchange methods

1. Safety over EtherCAT (FSoE) on Ethernet Interface 1 XF28/XF29 (Primary), same EtherCAT network

2. Safe MainInstance-to-MainInstance Communication (SMMC) over EtherCAT Automation Protocol (EAP) on Ethernet Interface 1 XF28/XF29 (Primary), different EtherCAT networks



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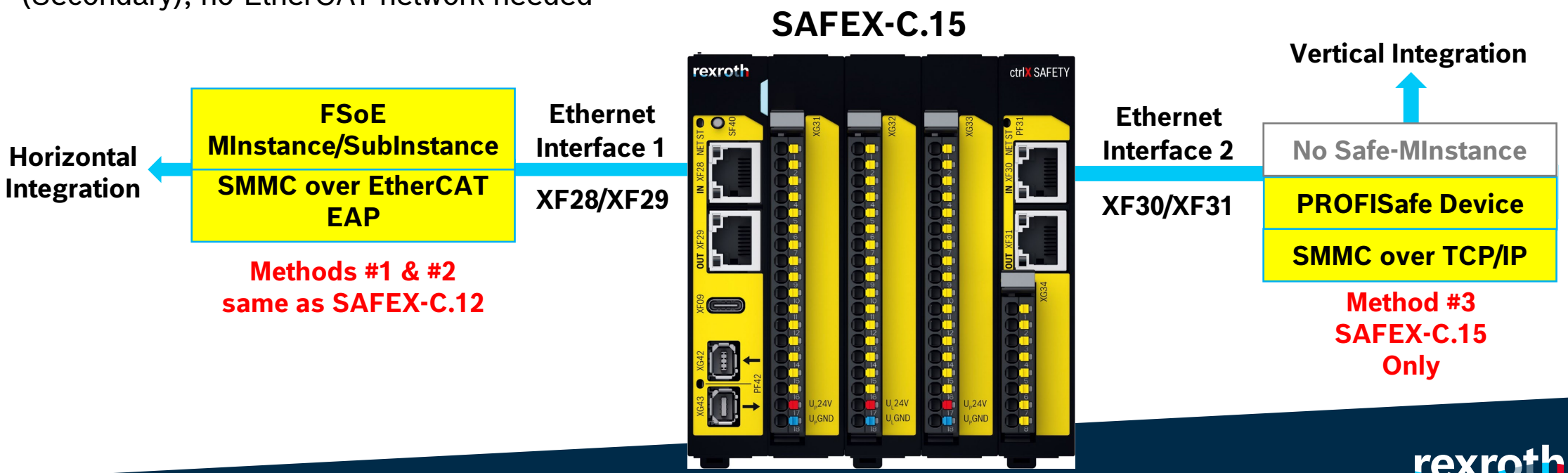
How to determine which SAFEX safe data exchange should be used SAFEX-C.15-to-SAFEX-C.15 three safe data exchange methods

1. Safety over EtherCAT (FSoE) on Ethernet Interface 1 XF28/XF29 (Primary), same EtherCAT network

2. Safe MainInstance-to-MainInstance Communication (SMMC) over EtherCAT Automation Protocol (EAP) on Ethernet Interface 1 XF28/XF29 (Primary), different EtherCAT networks

3. Safe MainInstance-to-MainInstance Communication (SMMC) over TCP/IP Ethernet Interface 2 XF30/XF31 (Secondary), no EtherCAT network needed



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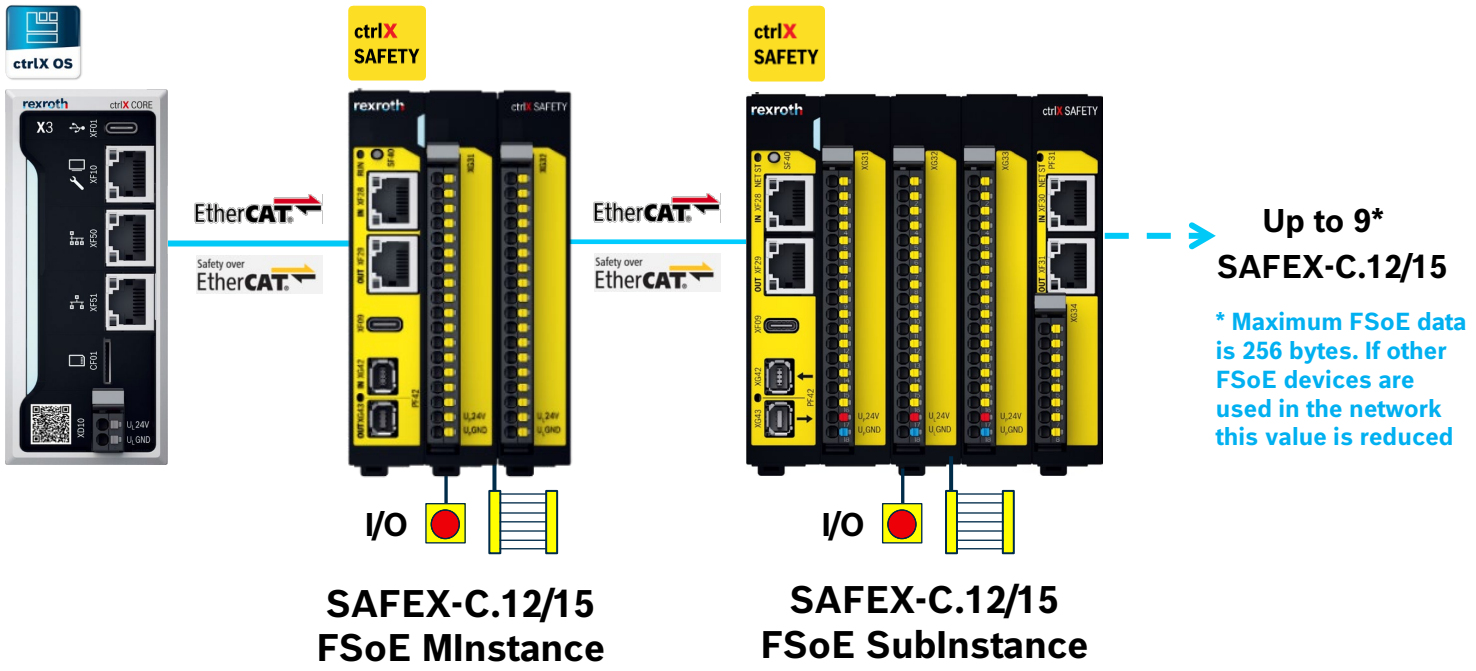
How to determine which SAFEX safe data exchange should be used
SAFEX-to-SAFEX safe data exchange Method #1 FSoE

- Up to 9* **ctrlX SAFETY** controllers via **Safety over EtherCAT FSoE (maximum 256 bytes per direction)**
- Allows connection within single EtherCAT network (**ctrlX CORE** /EtherCAT MInstance)
- 96 input/output bits per controller
- SubInstance-to-SubInstance data must pass through MInstance controller
- Separate **ctrlX SAFETY Engineering** Projects for each SAFEX controller
- **FSoE** between **ctrlX SAFETY** controllers **extends and scales capacity**
  - in CPU power and
  - Number of I/O



*** Maximum FSoE data is 256 bytes. If other FSoE devices are used in the network this value is reduced**

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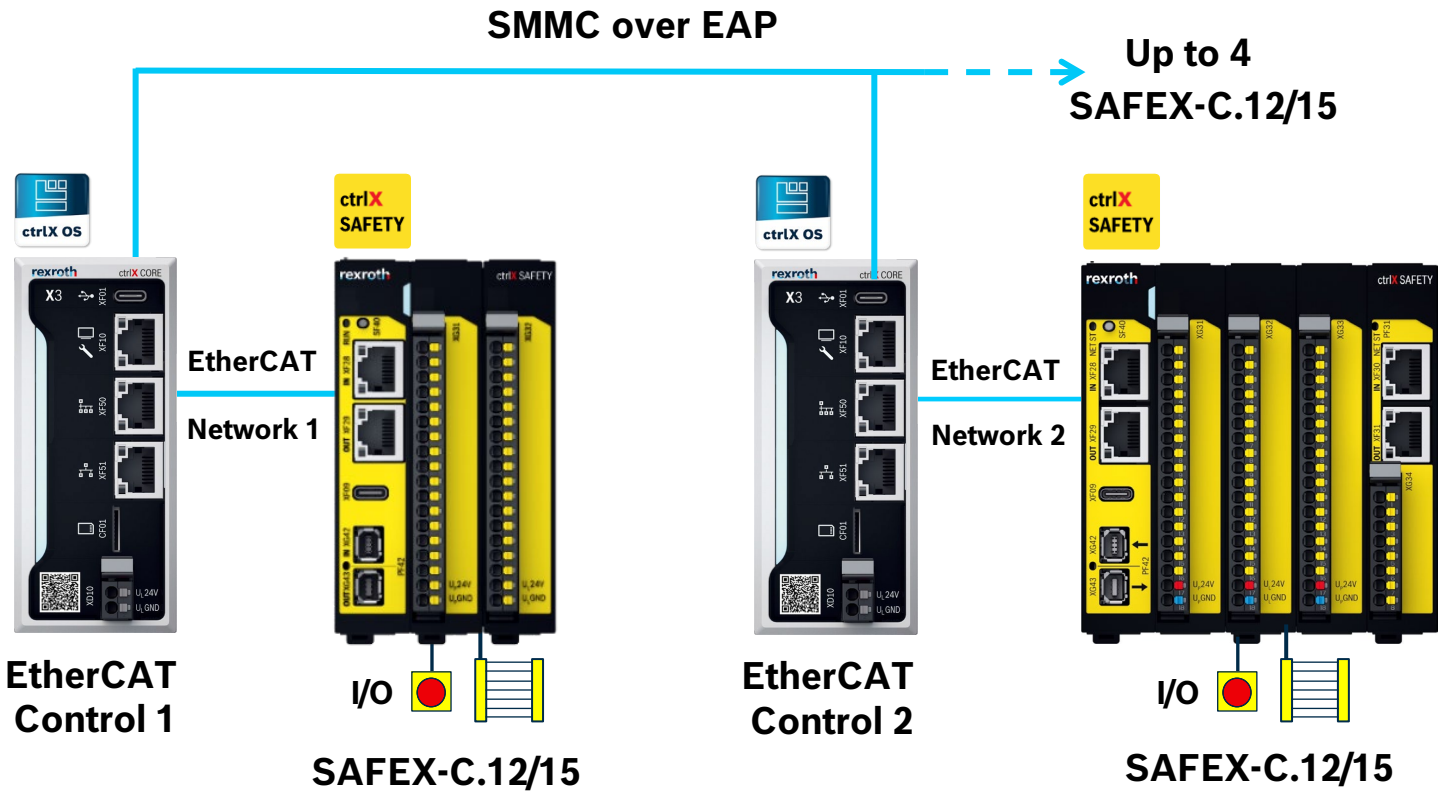
SAFEX-to-SAFEX safe data exchange Method #2 SMMC over EAP on Eth1

- Up to 4 **ctrlX SAFETY** controllers via **Safe-MInstance-to-MInstance-Communication (SMMC)** over **EtherCAT Automation Protocol (EAP)**
- Allows connection between different EtherCAT networks (**ctrlX CORE** /EtherCAT MInstance)
- 32 output bits per controller
- Participants can read all controller output bits (no passing of data through an EtherCAT controller)
- SMMC participant status can monitored
- Single **ctrlX SAFETY Engineering** Project for all SAFEX controllers
- **SMMC** between **ctrlX SAFETY** controllers **extends and scales capacity**
  - in CPU power and
  - Number of I/O



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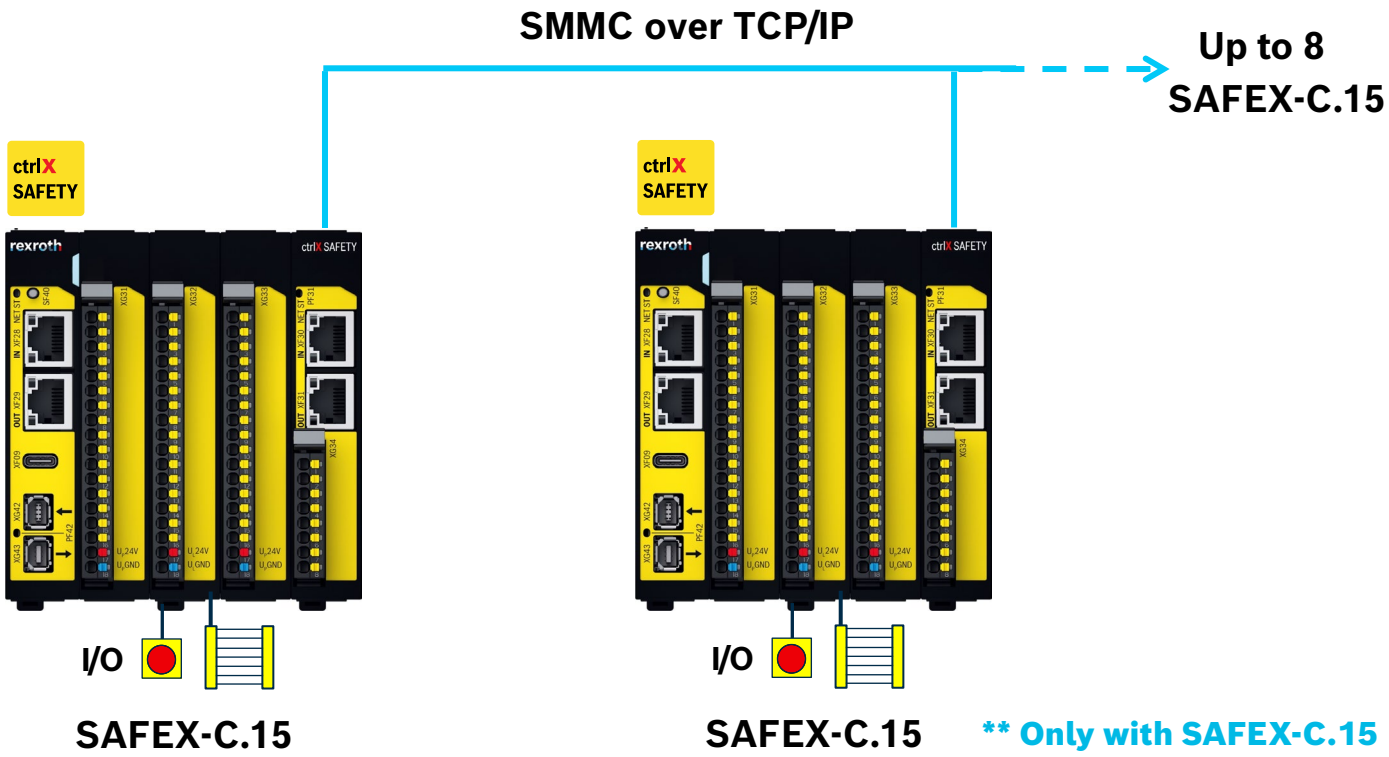
How to determine which SAFEX safe data exchange should be used

SAFEX-to-SAFEX safe data exchange Method #3 SMMC over TCP/IP on Eth2**

- Up to 8 **ctrlX SAFETY** controllers via **Safe-MInstance-to-MInstance-Communication (SMMC)** over **TCP/IP**
- Allows a standalone connection between SAFEX-C.15 controllers without an EtherCAT network or independent of the EtherCAT network
- 32 output bits per controller
- Participants can read all controller output bits (no passing of data through a controller)
- SMMC participant status can be monitored
- Single **ctrlX SAFETY Engineering** Project for all SAFEX controllers
- **SMMC** between **ctrlX SAFETY** controllers **extends and scales capacity**
  - in CPU power and
  - Number of I/O



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How to determine which SAFEX safe data exchange should be used
SAFEX-to-SAFEX safe data exchange methods summary

	Method #1 FSoE	Method #2 SMMC over EAP	Method #3 SMMC over TCP/IP
EtherCAT network required?	Yes	Yes	No
SAFEX-C.1x in the same EtherCAT network (MInstance)?	Yes	No	N/A
Number of CORES?	1	>1	0
SAFEX-C.12 or SAFEX-C.15?	SAFEX-C.12 SAFEX-C.15	SAFEX-C.12 SAFEX-C.15	SAFEX-C.15 Only
Number of bits between SAFEX-C.12/15?	96	32	32
Number of SAFEX-C.1x Controls Connected?	9*	4	8
Direct SubInstance-to-SubInstance data exchange?	No	Yes	Yes
Number of ctrlX SAFETY Engineering Projects?	>1	1	1

*** Maximum FSoE data is 256 bytes. If other FSoE devices are used in the network this value is reduced**

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Thank You!

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