MITSUBISHI ELECTRIC
Changes for the Better

TSN-IA Use Case
Hierarchical Domain based Network

IEC/SC65C/MT9=IEEE802.1//JWG P60802
Taro Harima: Mitsubishi Electric
2018-04-10

MITSUBISHI ELECTRIC
Changes for the Better

Overview

- A Hierarchical network system has
  - Public domain for the upper layer network(s)
  - Private domains of the field networks
- This configuration is popular in the Factory Automation industry, which accounts for two-third of the Industrial Automation Network nodes.
- These closed private field networks offer concurrent development, multi-vender procurement and protection from fault interference.

MITSUBISHI ELECTRIC
Changes for the Better

Private Domain

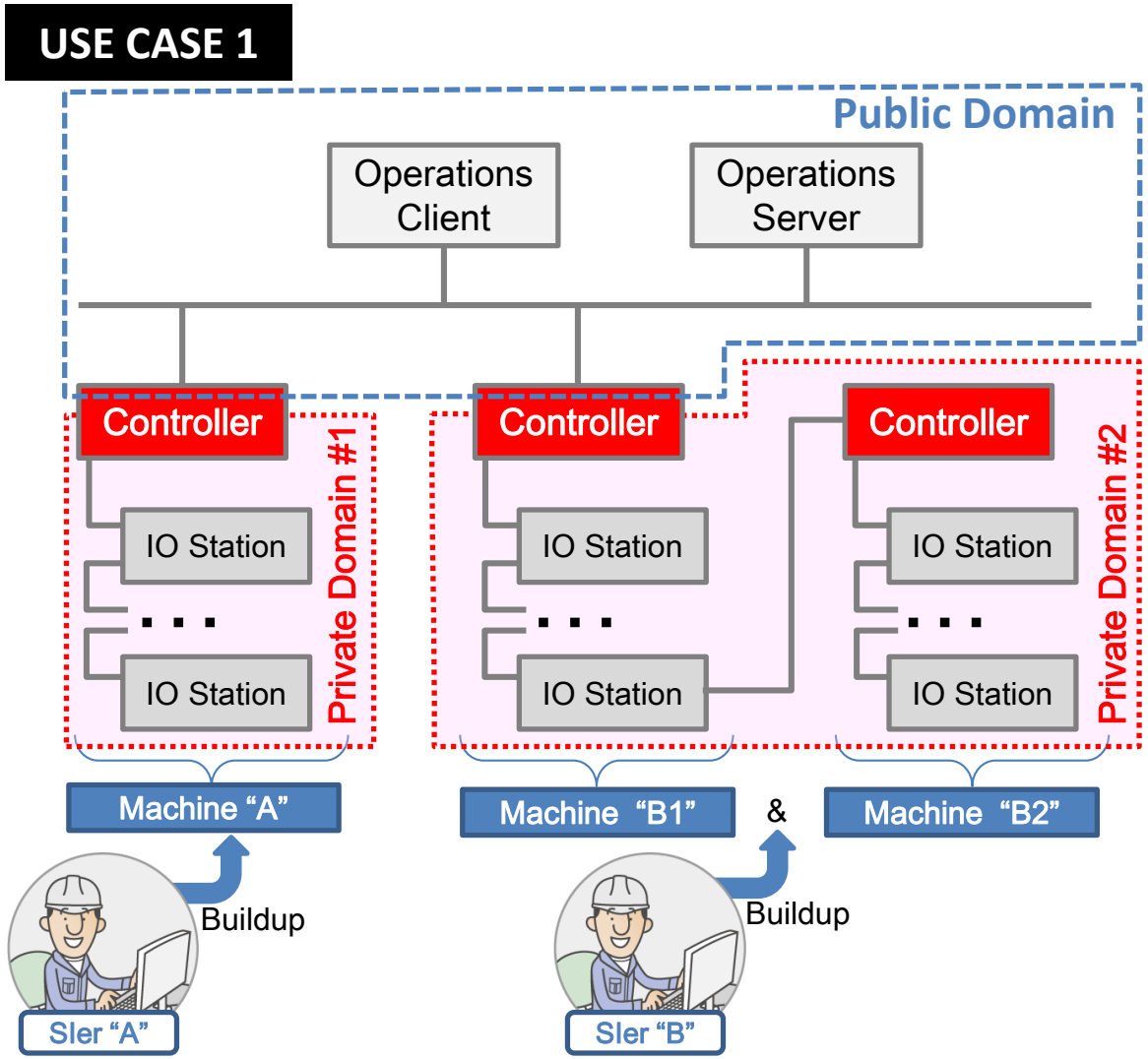
- Constrained access from outside
  - Nothing passes through the domain.
  - Nothing can directly access internal entities from outside.
- Preconfigured communications run there.
  - Only designated TSN streams run there
  - Communication priorities are static and fixed.
  - All Assets are thoroughly managed.

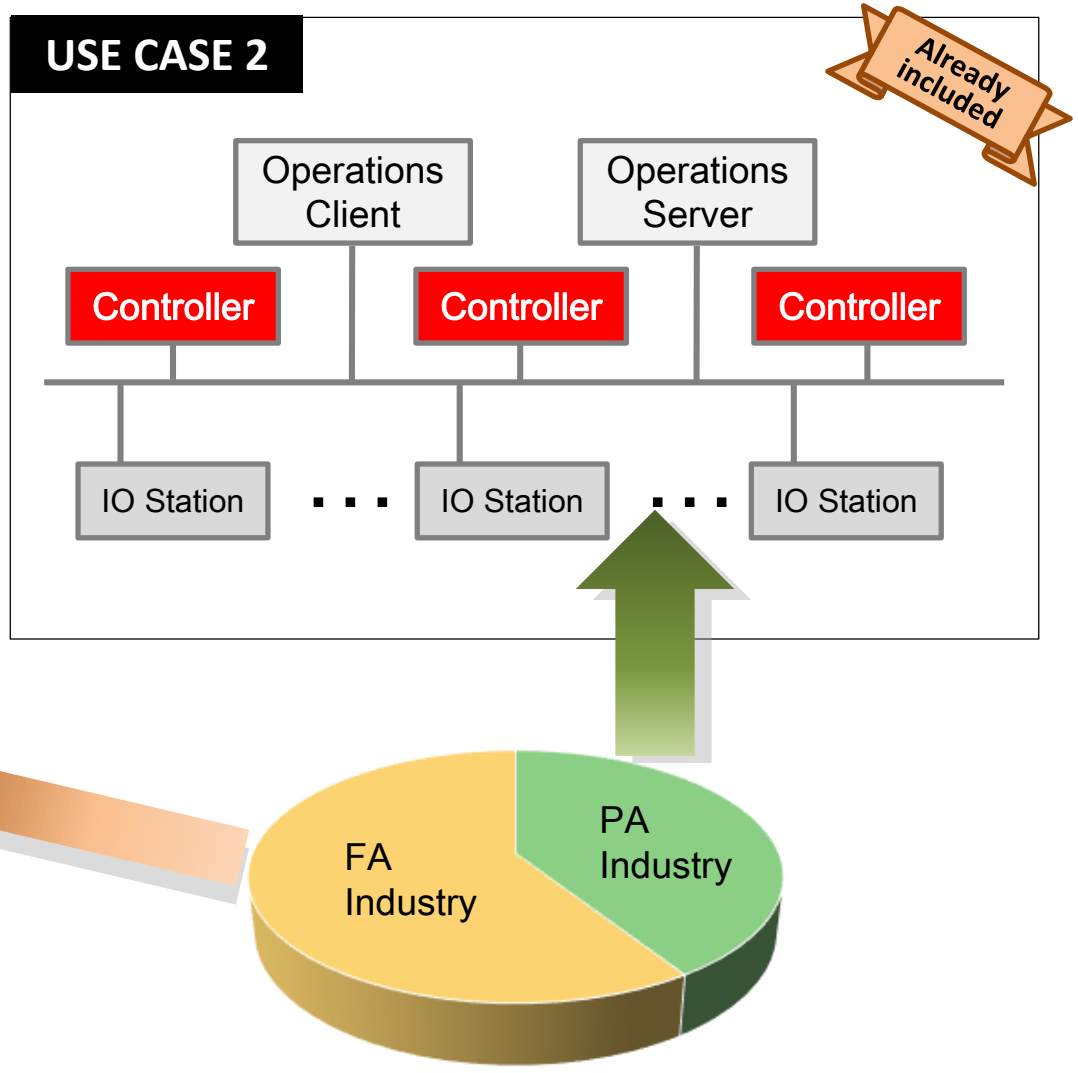
MITSUBISHI ELECTRIC
Changes for the Better

Public Domain

- They connect with the Open world.
- Any communications can run through them.
- Any entities can join in and/or leave off at anytime.

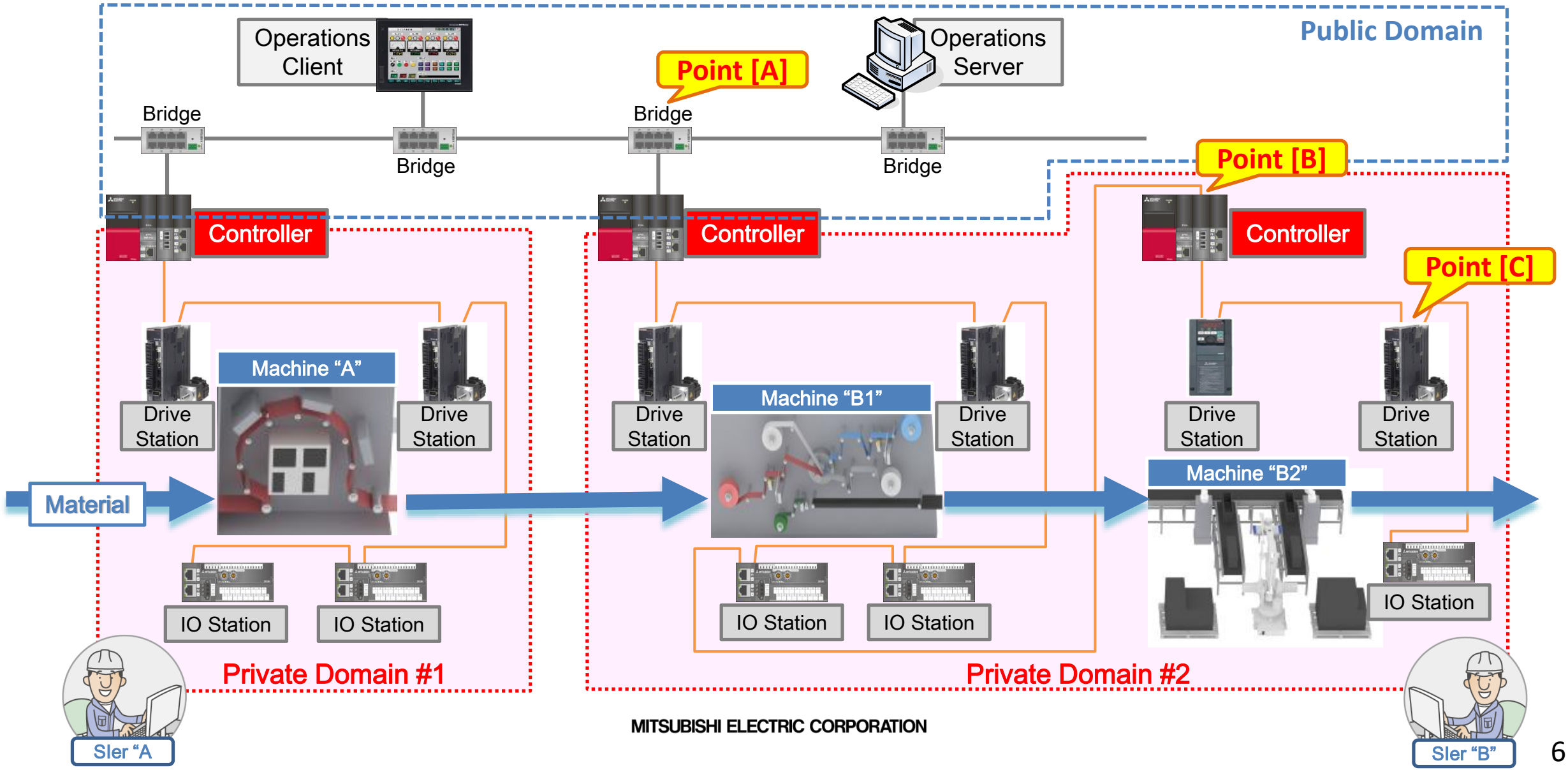
Use Case





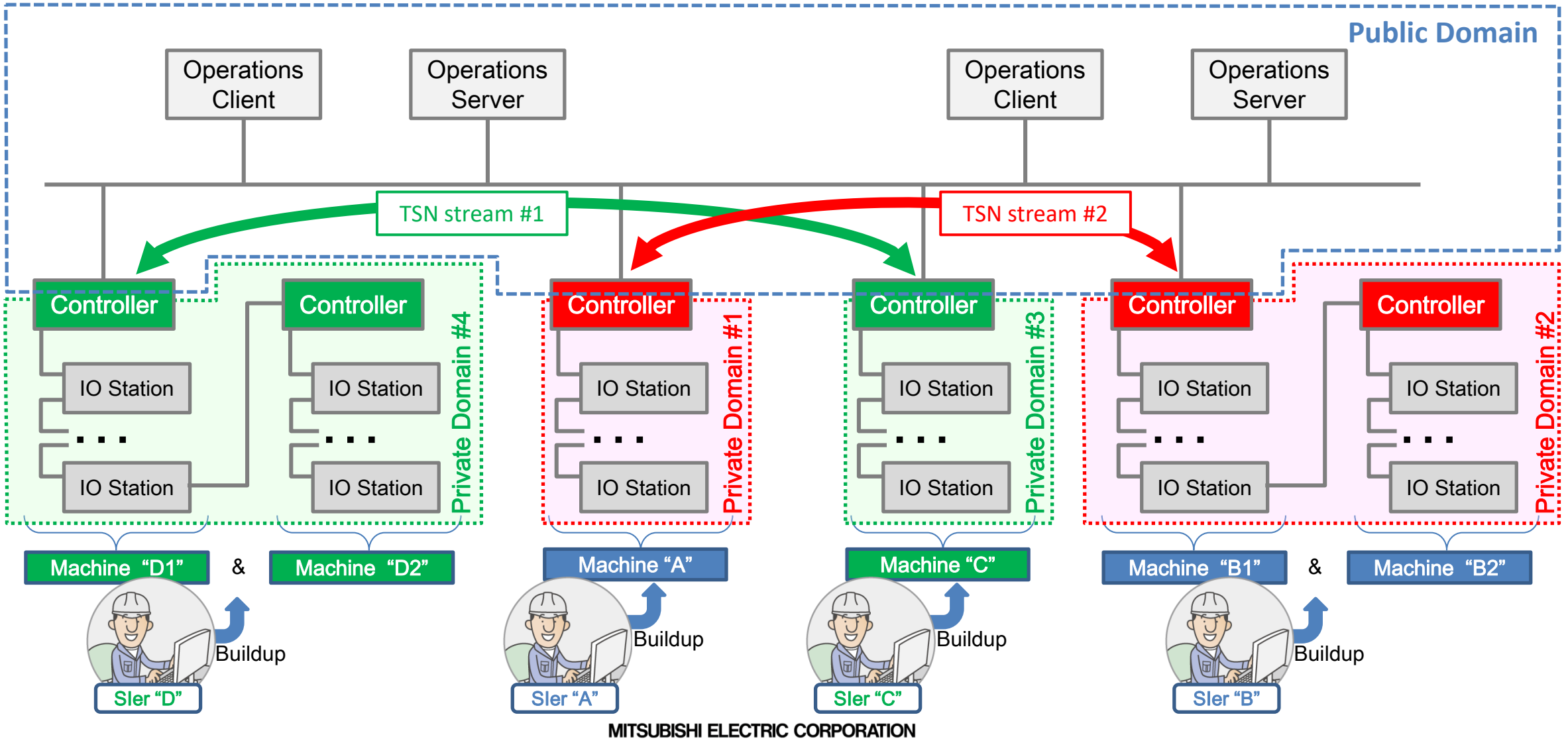
Field Network ration in Industrial field
[An assumption based on IHS Research 2016]

System Image in Use Case 1



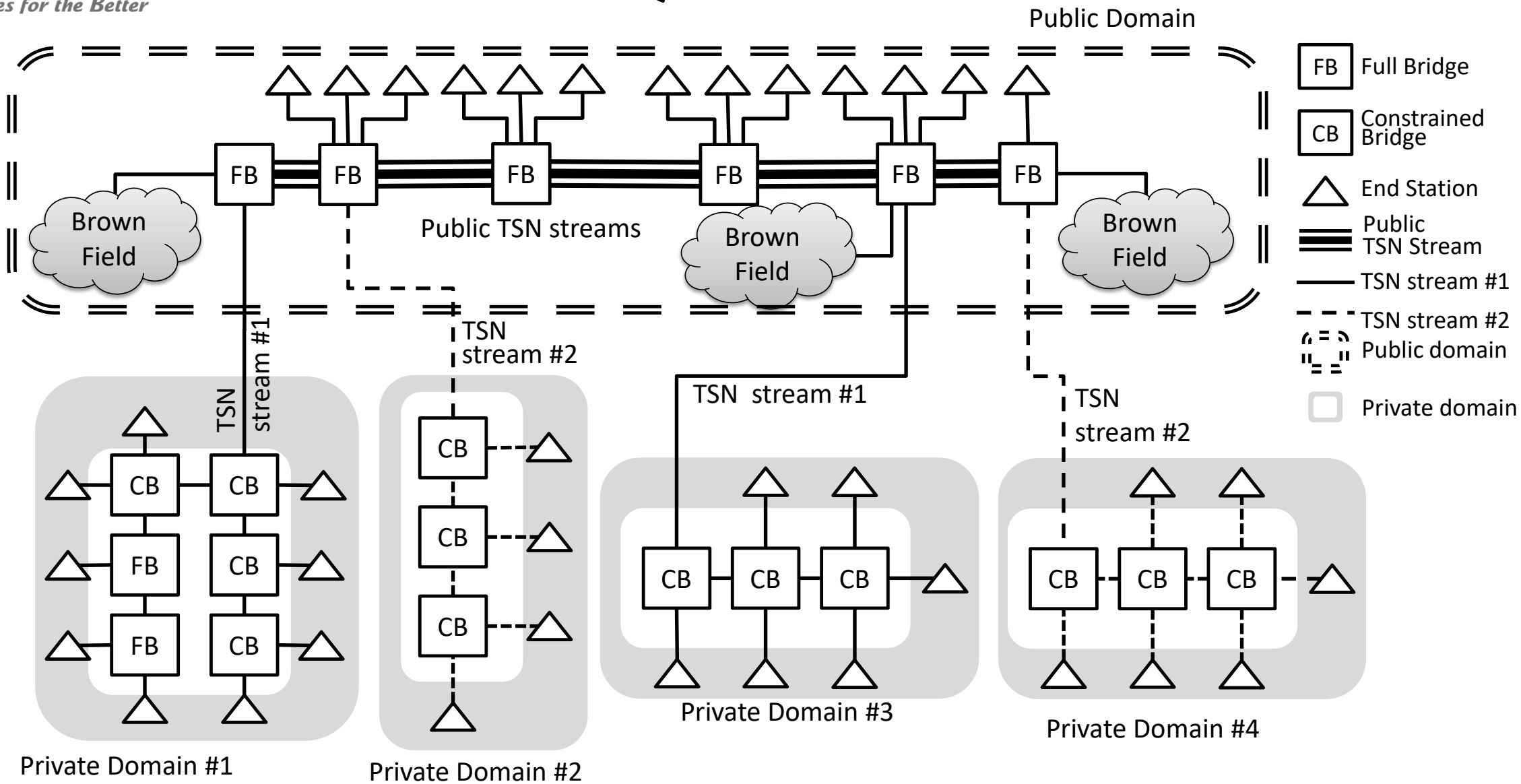
MITSUBISHI ELECTRIC
Changes for the Better

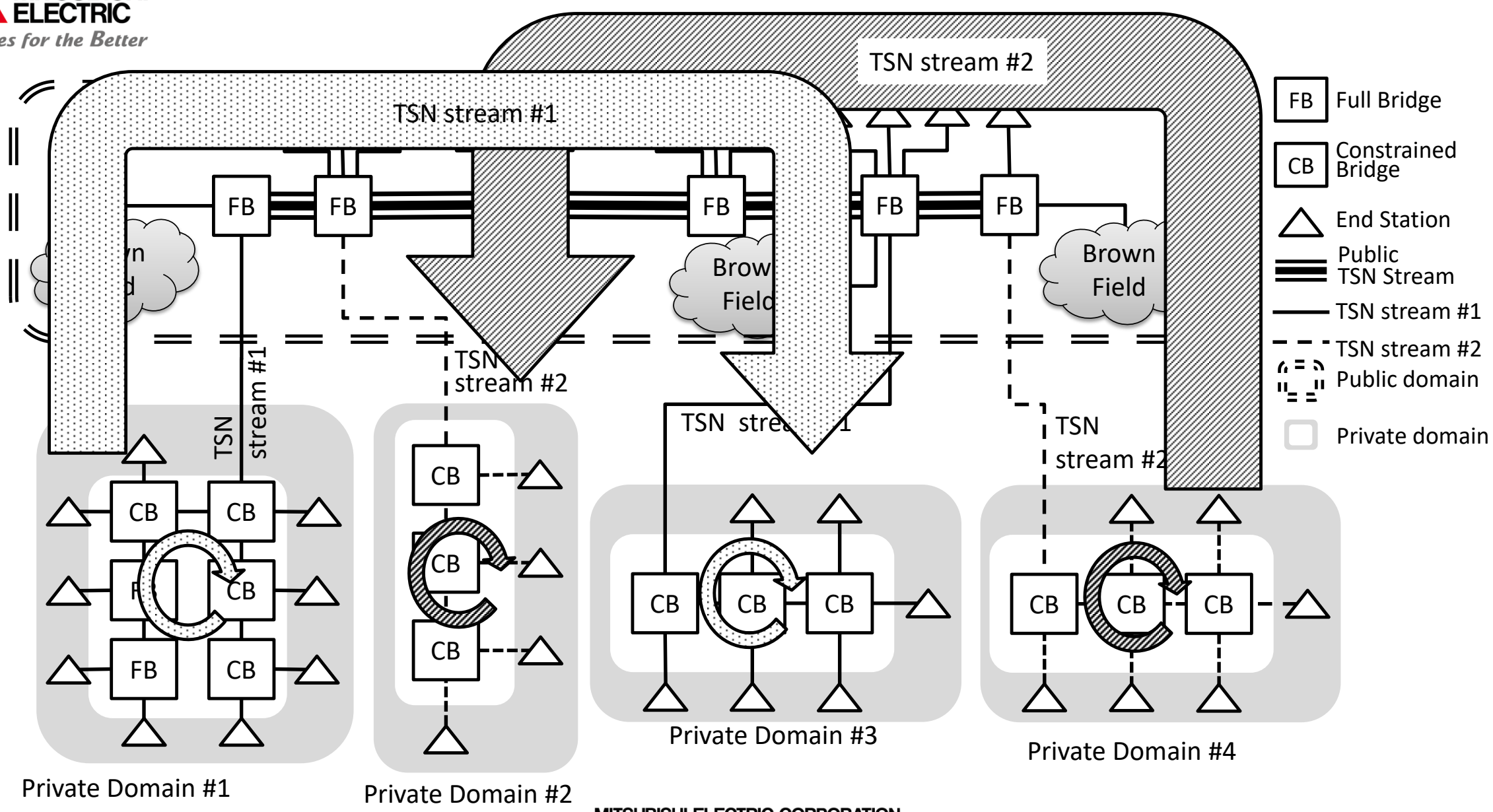
Multi TSN streaming in Use Case 1



MITSUBISHI ELECTRIC CORPORATION

IEEE802.1Q Model




TSN stream #2
TSN stream #1
FB
FB
FB
FB
FB
Brow
Field
Brown
Field
TSN
stream #1
TSN
stream #2
TSN stream #2
CB
CB
CB
CB
CB
CB
CB
CB
CB
CB
CB
CB
FB
CB
Private Domain #1
Private Domain #2
Private Domain #3
Private Domain #4
FB Full Bridge
CB Constrained Bridge
End Station
Public TSN Stream
TSN stream #1
TSN stream #2
Public domain
Private domain

MITSUBISHI
ELECTRIC
Changes for the Better