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SC Demo - Port 56324

Secure Connect Hubs

Secure Connect Device Summary

Secure Connect Hub Settings

Approved Devices

Auto Config URL: wss://demo.enteliweb.com:56325 Copy URL

Name	Device Number	Node Type	Status	Object Reference	Actions
SC Demo	88	Primary Hub	Online		
SC Demo O3	100	Regular Node	Online	Secure Connect 1	

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Approval Queue

<input type="checkbox"/> Name	Device Number	Request Date	Status
<input type="checkbox"/> George's Tech Laptop	956478	Dec 10, 2019 21:01	Pending

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Introduction to BACnet Secure Connect


AGENDA


- What is BACnet/SC?
- Comparison to BACnet/IP
- How It Works
- Use Cases and Best Practices


 Dashboards




 Navigation


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 SC Demo - Port 56324






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What is BACnet/SC?

What is BACnet/SC?

- BACnet addendum bj
- Adds **encryption** to native BACnet
- Adds **authentication** to native BACnet
- Puts BACnet/IP inside HTTPS (WebSocket)
- Additional medium to route traffic
- Interoperable



ANSI/ASHRAE Addendum bj to
ANSI/ASHRAE Standard 135-2016



**A Data Communication
Protocol for
Building Automation
and Control Networks**

What **isn't** BACnet/SC?

- No authorization – everyone talks to everyone
- Not available on other mediums
- Not a toolset for encryption – we provide that for you
- Not a means to route other traffic – only BACnet
 - ~~Modbus/IP~~
 - ~~Web Browser Traffic~~
 - ~~IP Cameras~~
- Not a way to protect devices – only the link

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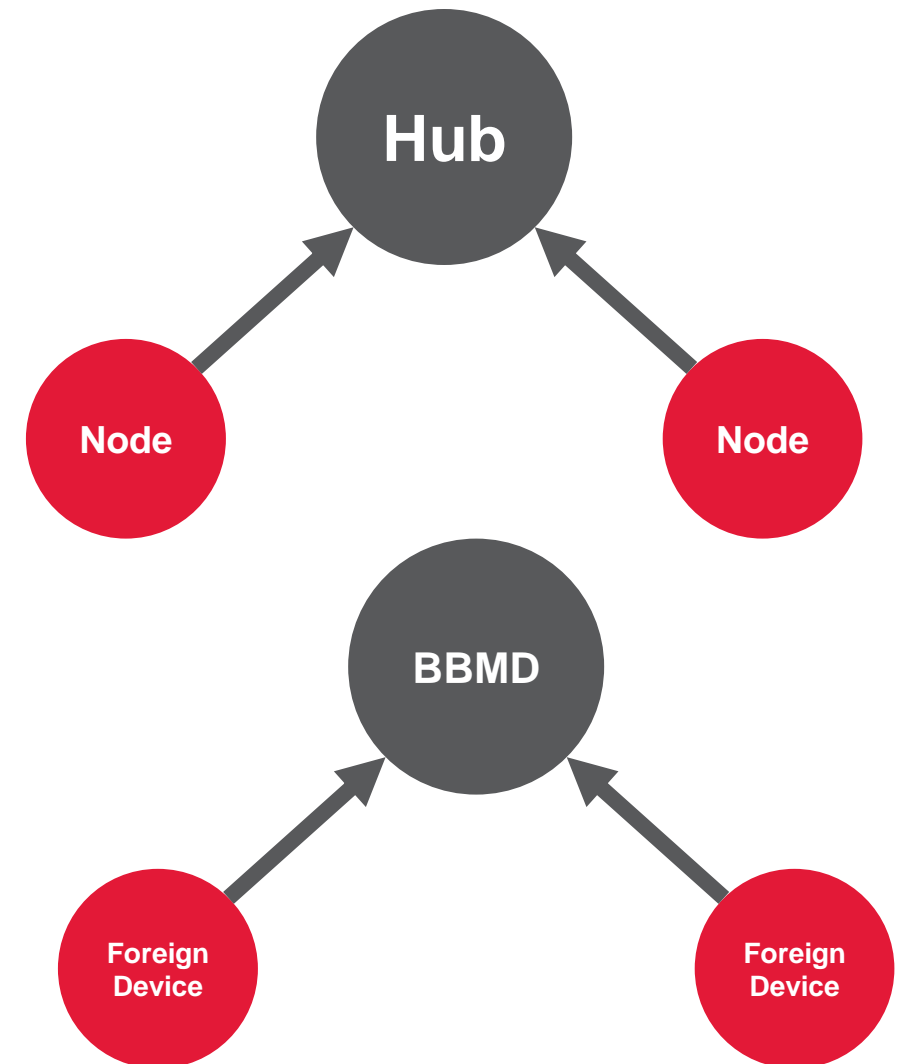
Auto Refresh

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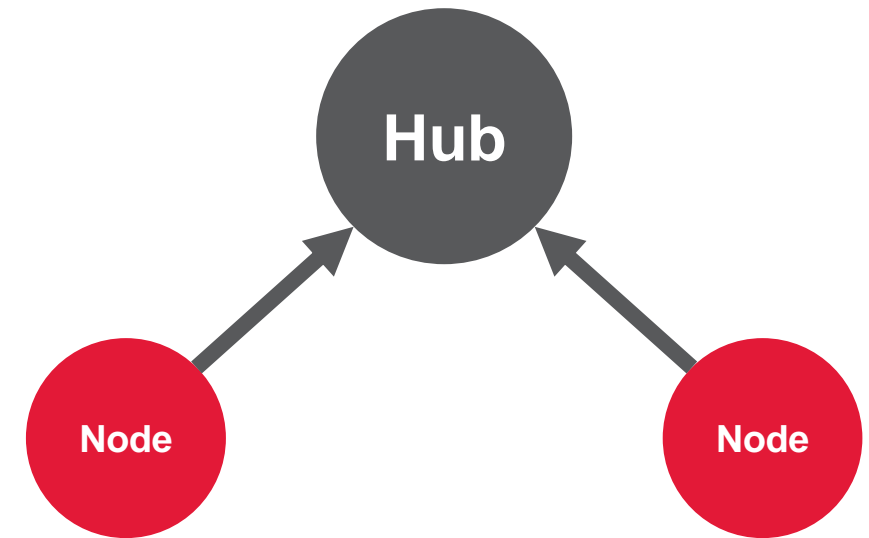


BACnet/SC vs BACnet/IP

- **SC Hub**: a central point, routes traffic for BACnet/SC
 - Kind of like a BBMD
- **Regular Node**: a device connected to a hub
 - Kind of like a foreign IP device

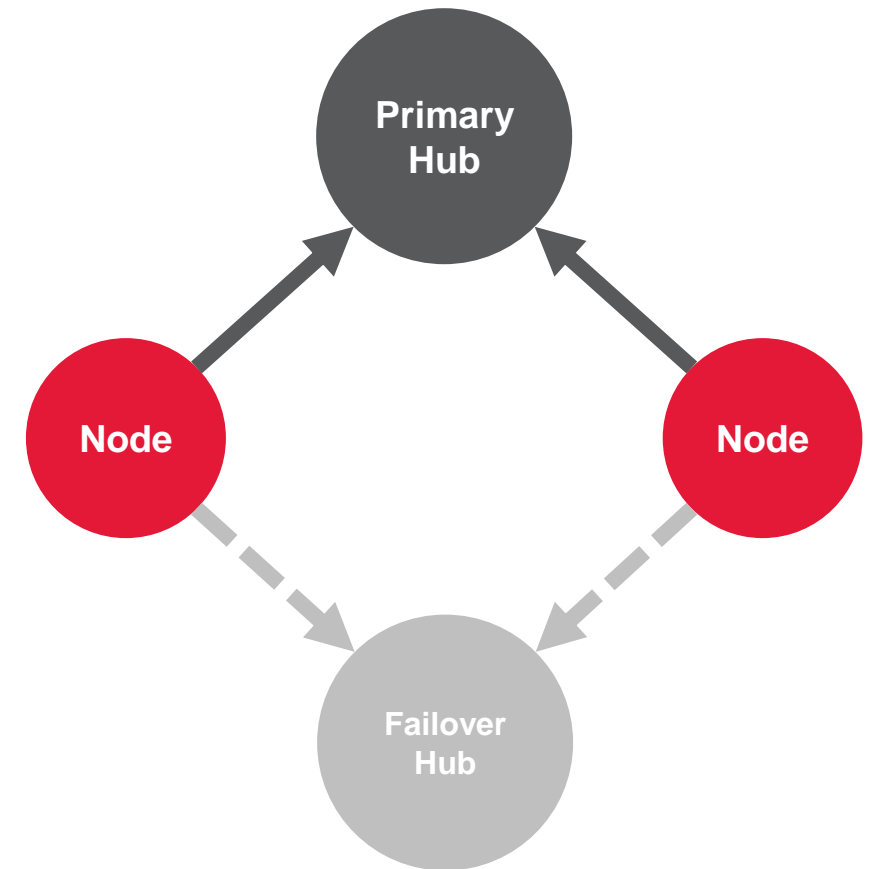


- Hubs need to be accessible by nodes
 - Public IP
 - Preferably a hostname
 - Just like BBMDs
- Nodes do not need to be accessible
 - They reach out to the hub
- If entirely on a private network, no public IP is needed



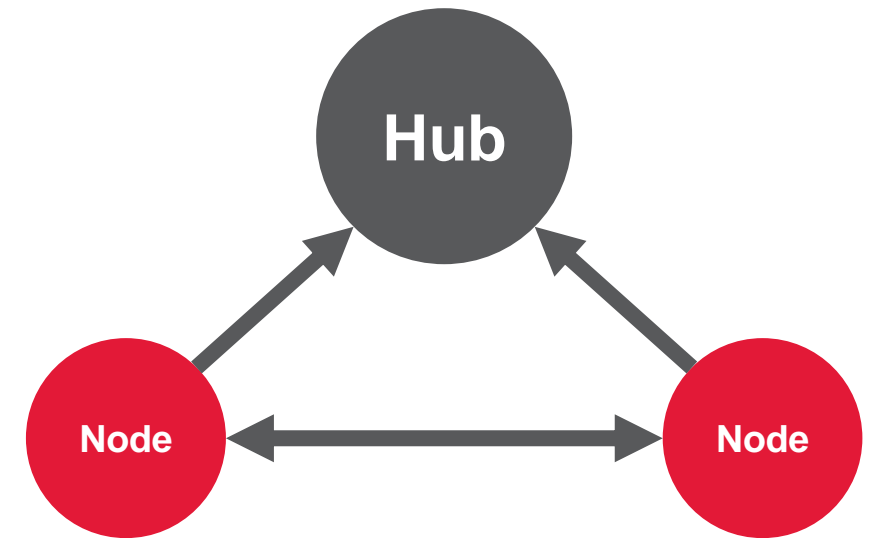
Failover Hubs

- Standard allows for a failover hub
- Backup device which takes over if primary goes away (power outage, network failure, etc)
- Nodes must know hostname of primary and failover hubs



Node to Node

- At first, nodes will reach out to the hub and start communicating with it
- After this, if they can find each other, they can communicate directly
- Still encrypted/authenticated/etc
- Reduces load in the hub, reduces network traffic, etc



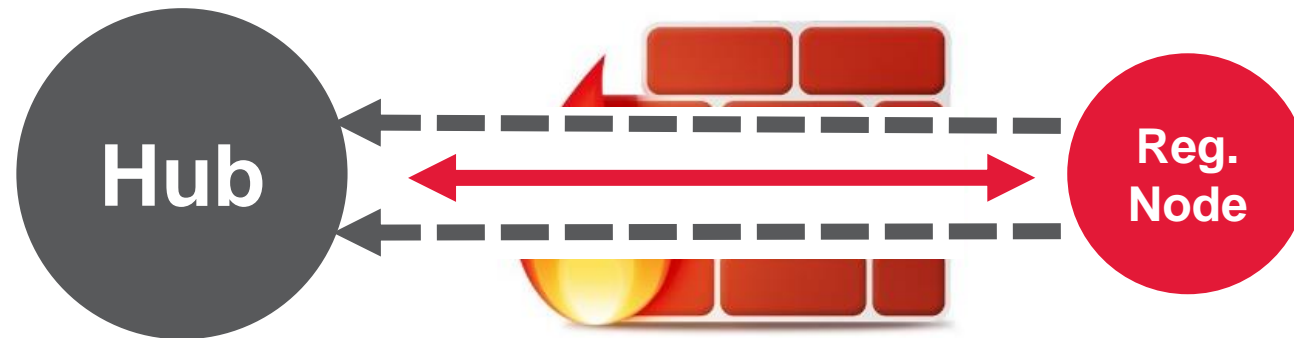
What's a Hostname Anyways?

- Hostname – unique name assigned to a device
 - Domain Name System (DNS) – global
 - Resolves hostname + domain name to an IP
 - Allows an IP to change, entry to be updated
 - Hubs should have hostnames set
-
- Buy a domain (\$12/year) and use it to set subdomains for your hubs/sites
 - Use a free service like Dynamic DNS

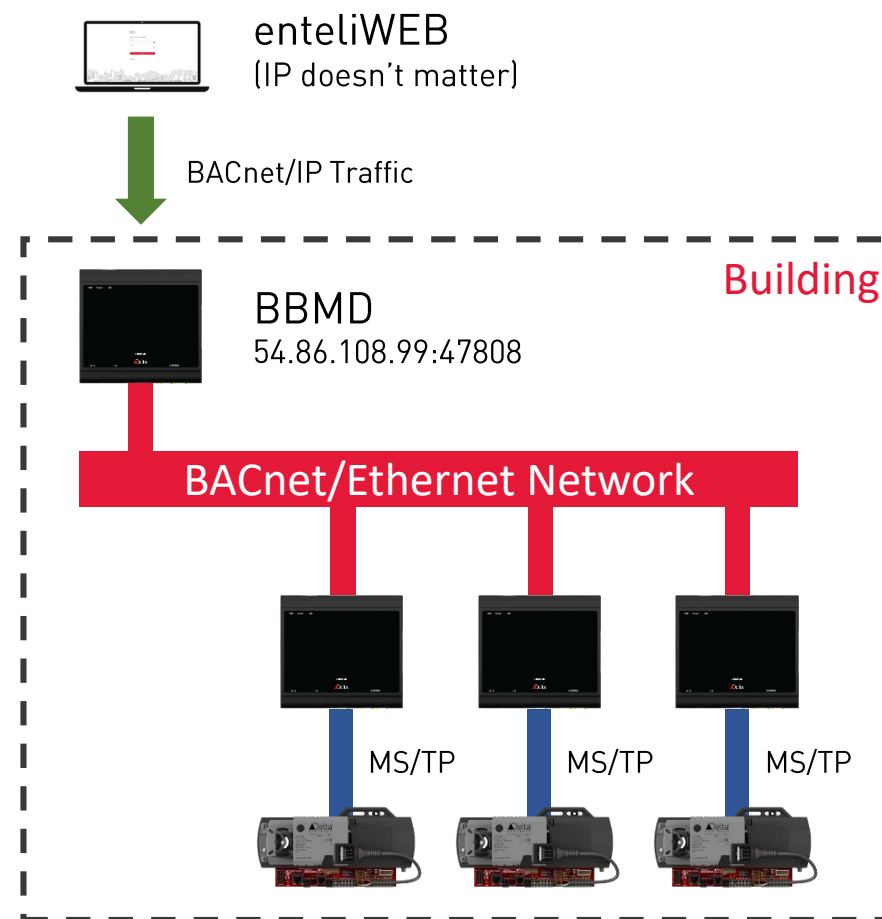
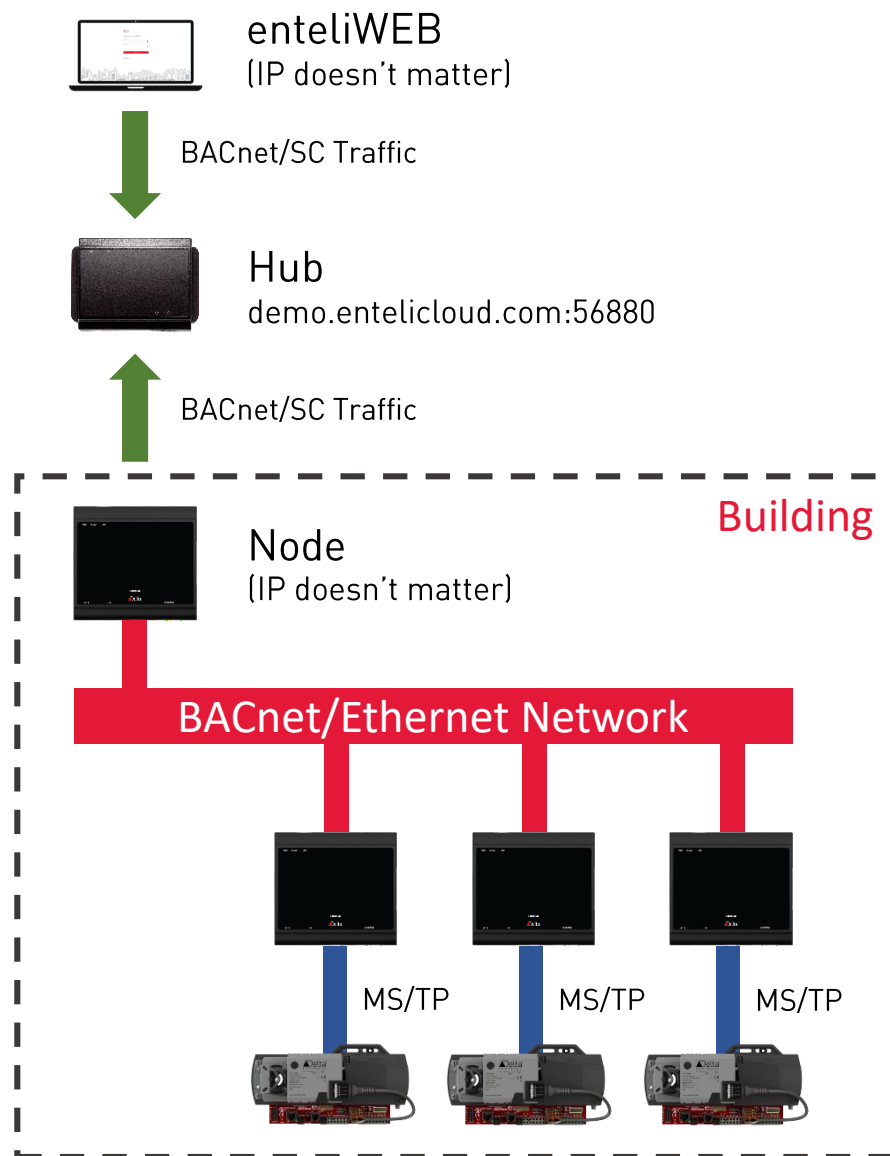
Hostname	IP Address
google.com	74.125.135.139
deltacontrols.com	209.52.68.91
support.deltacontrols.com	209.52.68.93

WebSocket Tunnel

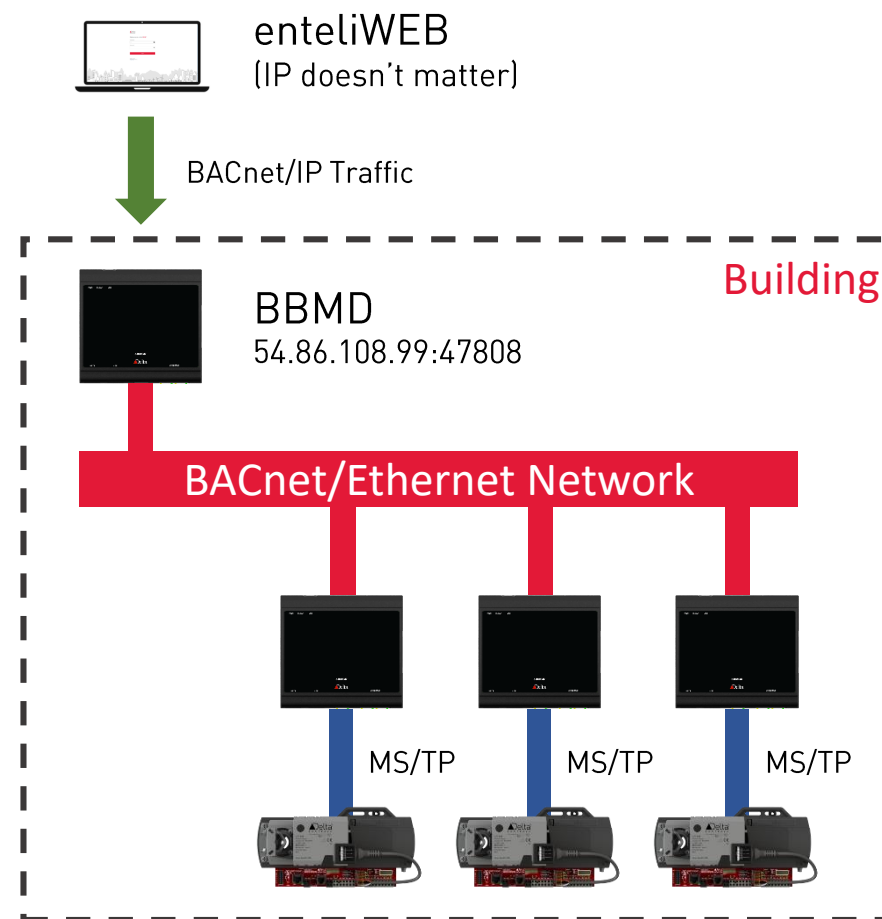
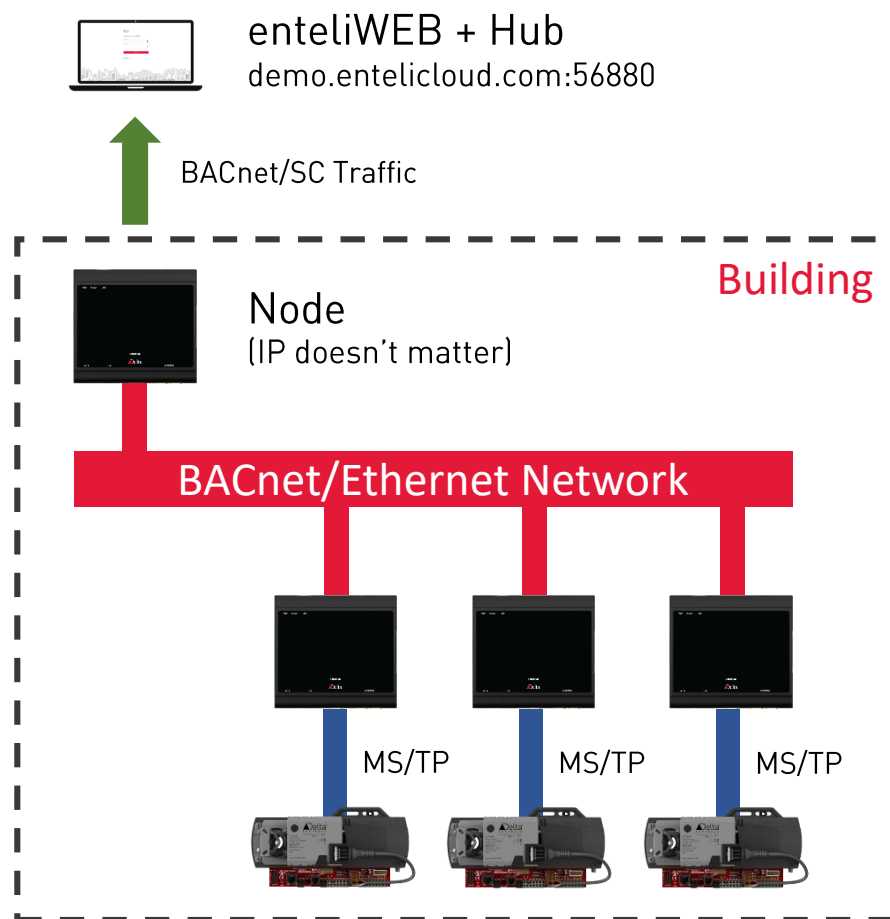
- Tunnel created through outgoing connection
- Node reaches out to the hub
- BACnet/IP inside the tunnel
- Allows bi-directional communication
- Firewall allows outbound traffic
- No port opened, IT is happy 😊



IP vs SC



IP vs SC



Devices Supporting SC

Hubs



enteliWEB
4.14



enteliCLOUD
1.2



enteliWEB
4.14



enteliCLOUD
1.2

Nodes




eBCON-2
4.9





eBMGR-2
4.9





03-DIN-CPU
4.9


 Dashboards




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
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How Does It Actually Work?

- **Public Key:** what you give out
 - Allows others to decrypt what you send them
- **Private Key:** remains with you
 - A secret – no one else has it
 - Never leaves your device
 - How you encrypt messages

HELLO
my name is

```
04 ee 84 fa 2f bd 18 b7 44 c6 42
83 02 10 7b 60 33 60 4c 9b 23 79
80 c4 88 bf cf 1c 1c d0 96 a5 11
52 7b 87 7e e3 9d 98 be 51 d5 28
06 61 90 59 11 b1 cc 08 b2 33 43
e9 b8 46 c1 20 ab 9b f9 c3 c5
```





Google.com

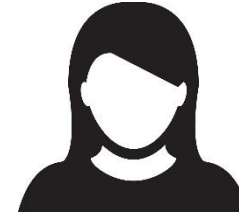
End to End Encryption


Bob

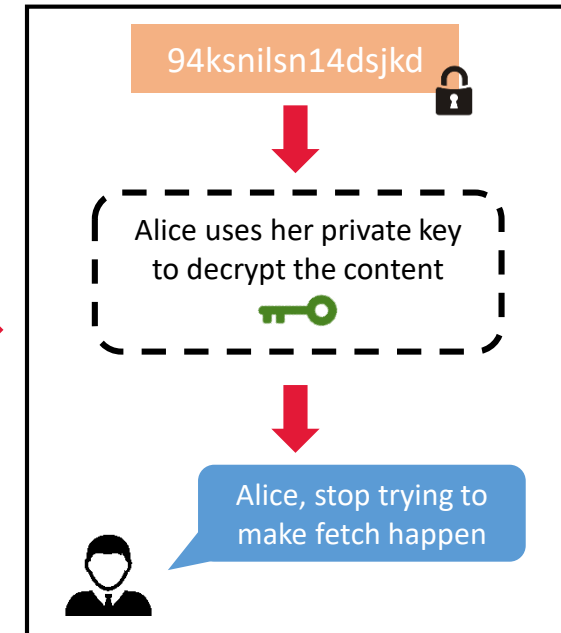
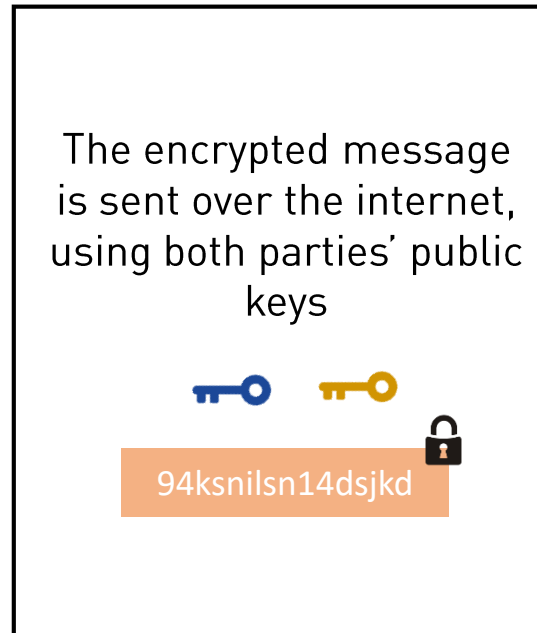
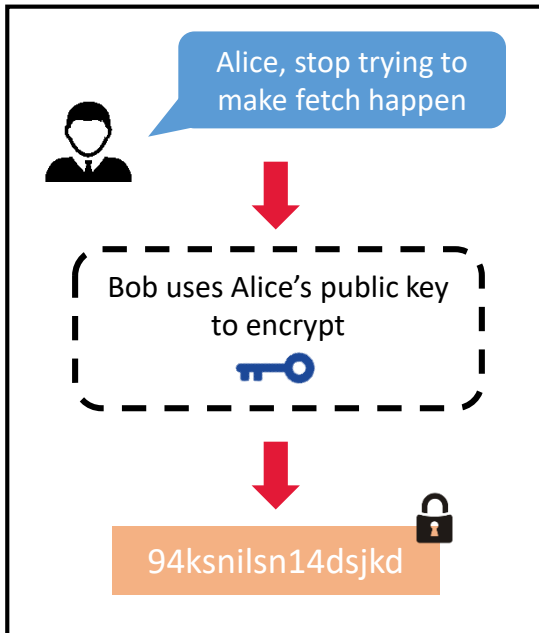


 Bob's Public Key
 Bob's Private Key

Alice

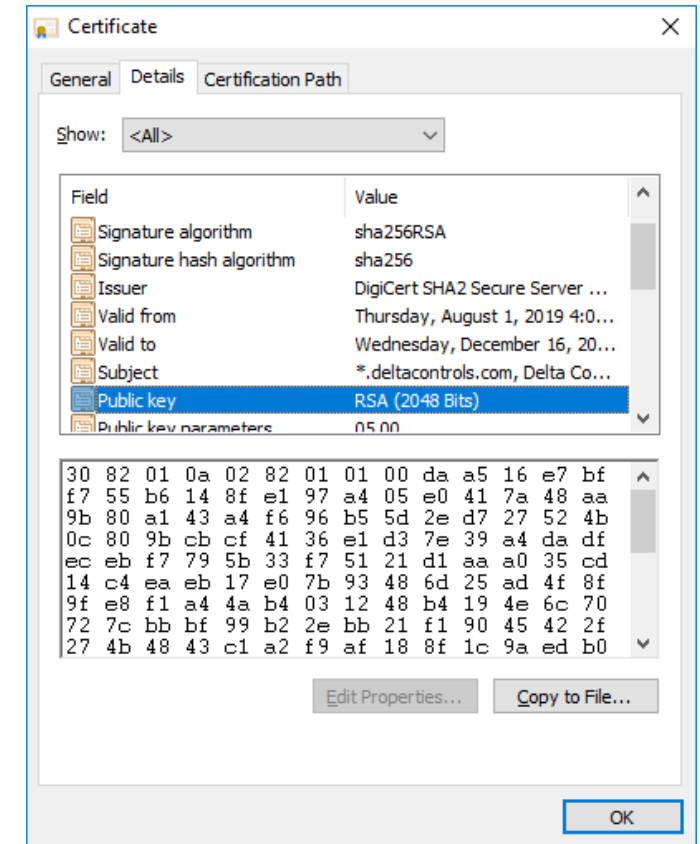


Alice's Public Key 
Alice's Private Key 



Certificates

- **Certificates** serve two functions:
 - Verify identity of the device (authentication)
 - Allow encryption between devices
- BACnet calls it your 'Operational Certificate'
- Identity is referred to as 'Subject'
 - The website URL (HTTPS)
 - The device's hostname (SC)
- How you share your **public key**
- Based on your **private key** (but does not contain it)
- Signed by a **Certificate Authority** (CA) - Issuer



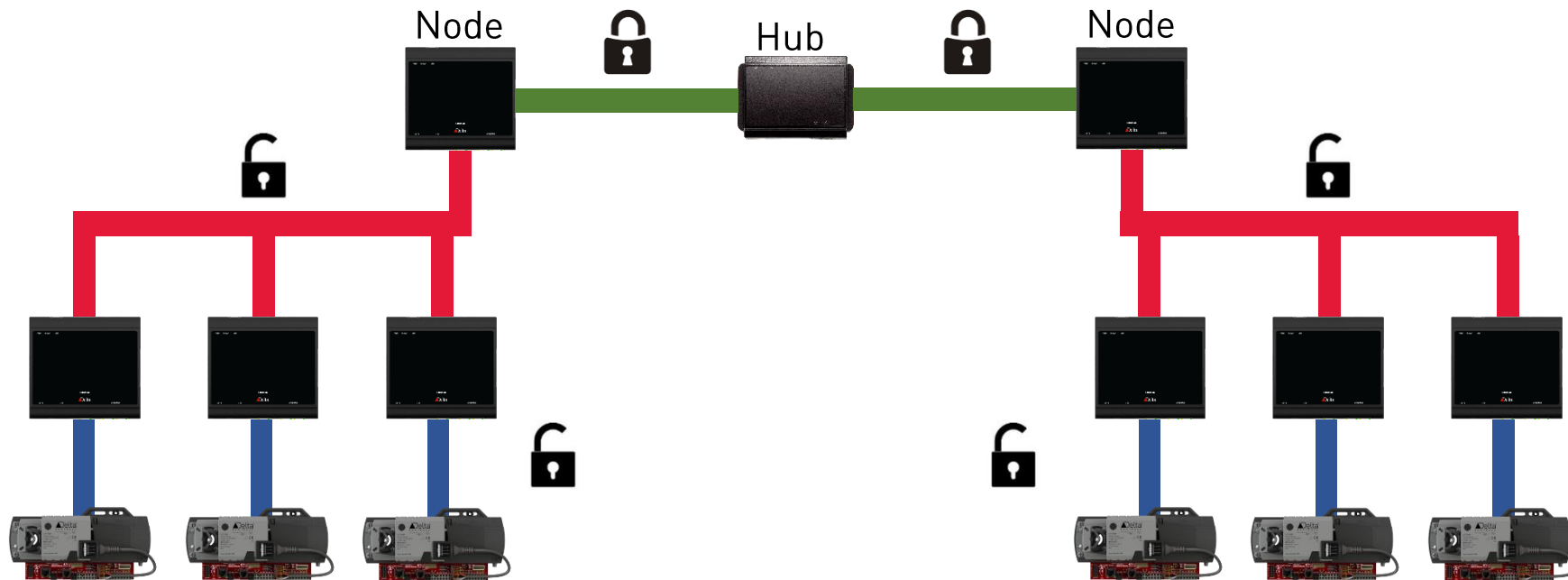
Certificate Authorities

- **Certificate Authority**: signs certificates and enables trust
 - All parties agree to trust the same CA
 - Does not need to be online
 - You can reference more than one (chain of trust)
 - You can run your own, as long as others agree to trust it

Rank	Issuer	Usage	Market share
1	Comodo	6.1%	41.0%
2	Symantec	5%	30.2%
3	GoDaddy	2.2%	13.3%
4	GlobalSign	1.7%	10.4%
5	DigiCert	0.5%	3.1%

Network Considerations

- Secure Connect
- Ethernet
- MS/TP



Representation in BACnet


- Each node has an NP object for the BACnet/SC connection
- Hubs also have NP objects for the hub definition
- The NP object contains the keys (public + private) and certificate


Secure Connect 1 (200.NP9)

Protocol Level	BACnet Application
Network Type	Delta Secure Connect
Reliability	No Fault Detected

Configuration


Out Of Service	<input type="checkbox"/>
Command	Idle
Enable Routing	<input checked="" type="checkbox"/>
Network Number	49999
Auto Config URL	wss://demo.enteliweb.com:56351
Primary Hub URL	wss://demo.enteliweb.com:56350
Failover Hub URL	
Commissioned	<input type="checkbox"/>


 Dashboards




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🕒 Approval Queue

✓ Approve | ⚪ Reject

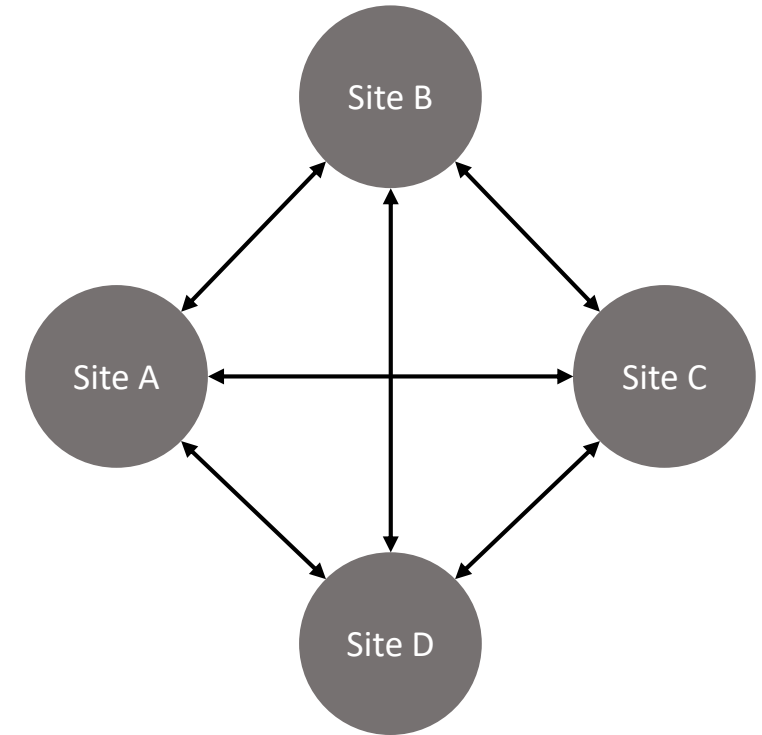
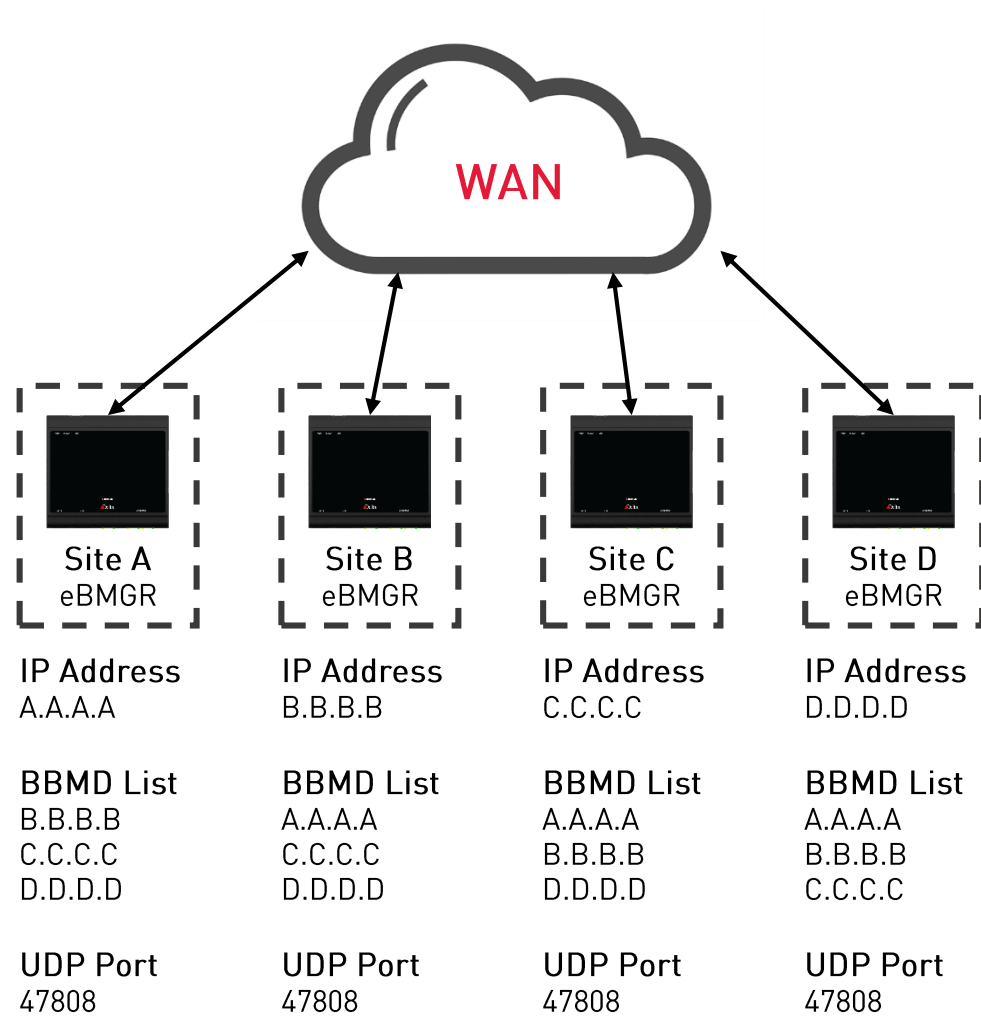
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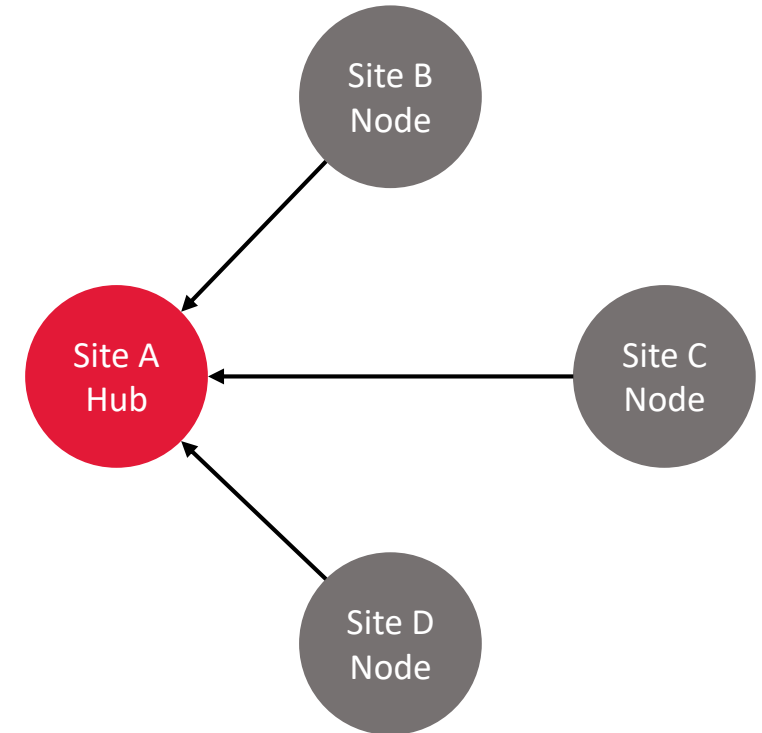
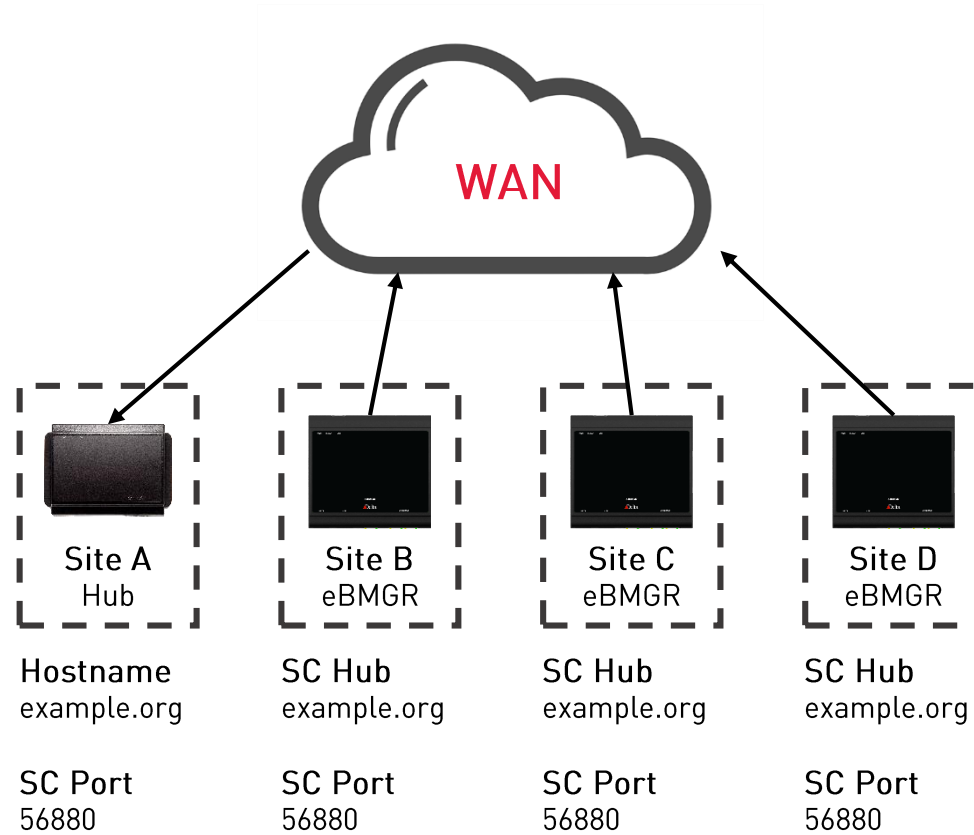
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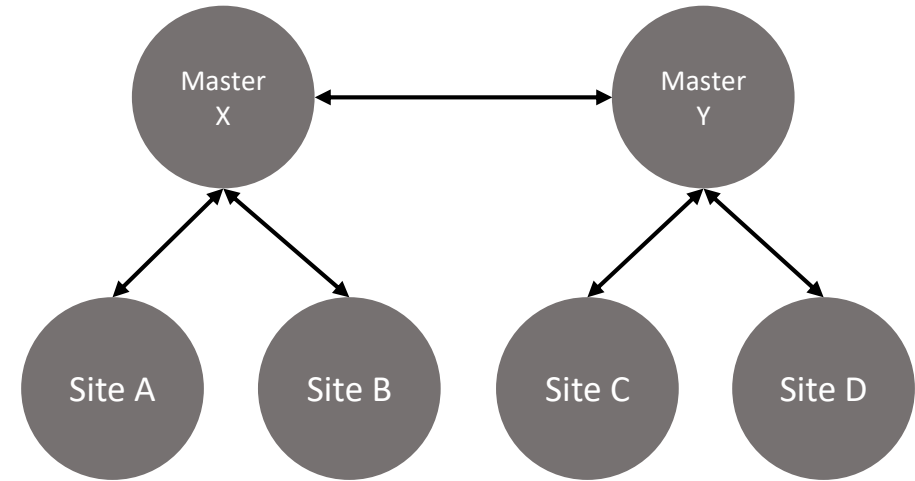
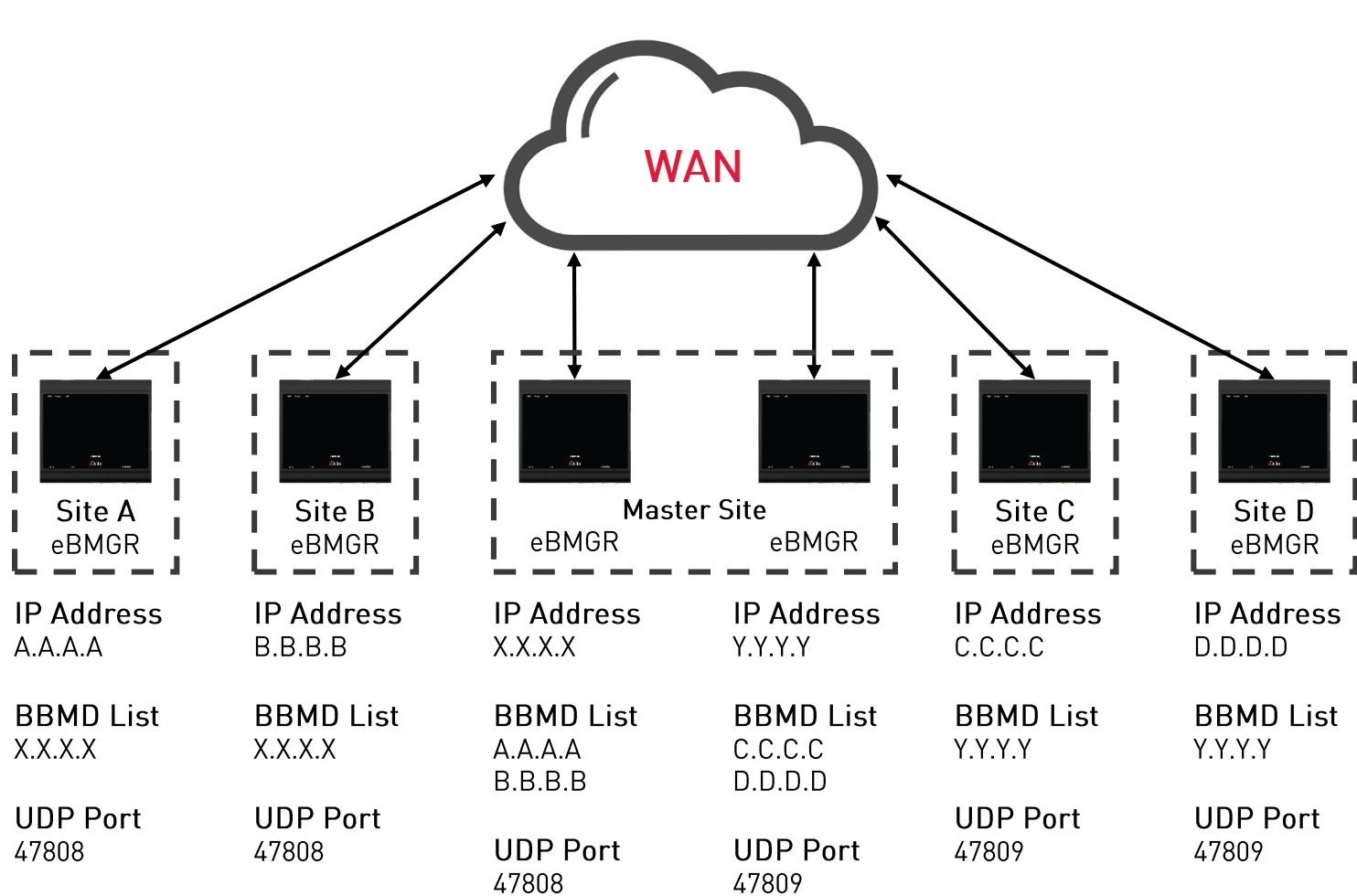
Small WAN – BACnet/IP



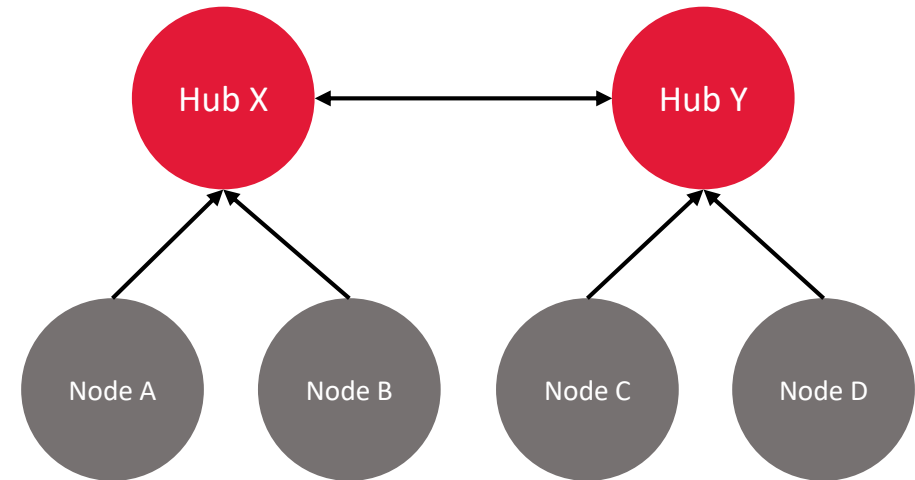
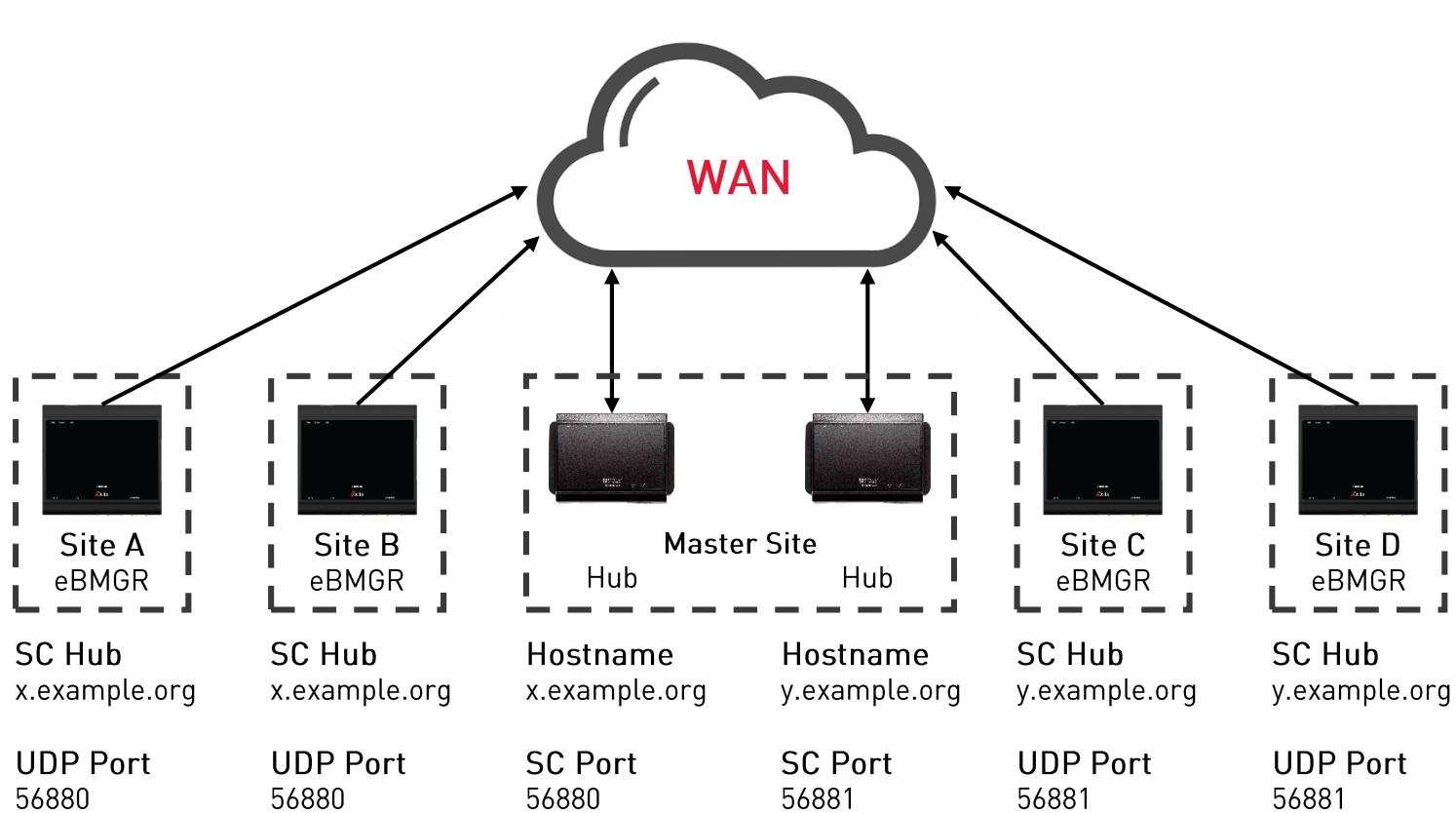
Small WAN – BACnet/SC



Large WAN – BACnet/IP



Large WAN – BACnet/SC



Best Practices

- Use SC for untrusted networks
 - The Internet
 - Public networks
- Replace BBMD IP connections with SC
- Less pressure to encrypt inside the building
 - For now...