Advanced Networking for AV Professionals

Kathryn Taub
Technical Sales Engineer
kathryn.taub@audinate.com

TODAY'S TOPICS

Network Concepts

- Network Devices
- Core IP Settings
- Automatic IP Addressing
- Network Topology
- Types of Network Data
- Segmenting the Broadcast Domain
- Network Ports

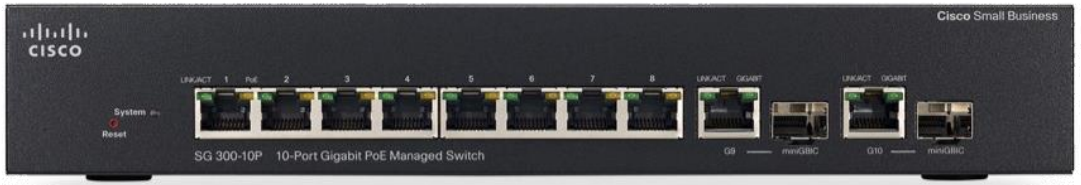
Dante Domain Manager Topics

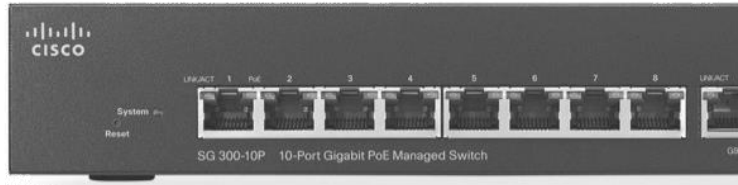
- Overview of Features
- Servers
- Dante Discovery
- Clocking in Dante Domain Manager
- LDAP
- SNMP

Network Devices: *Switches and Routers*

SWITCHES

- Switches connect devices on a common network
- Switches use MAC addresses to forward data only to the devices that need to receive it
- Switches support all ports going full speed in both directions at all times
- Use gigabit (or faster) switches!





MANAGED VS. UNMANAGED

MANAGED

- More Expensive
- Many Possible Settings – (and risks)
- May be required in some conditions

UNMANAGED

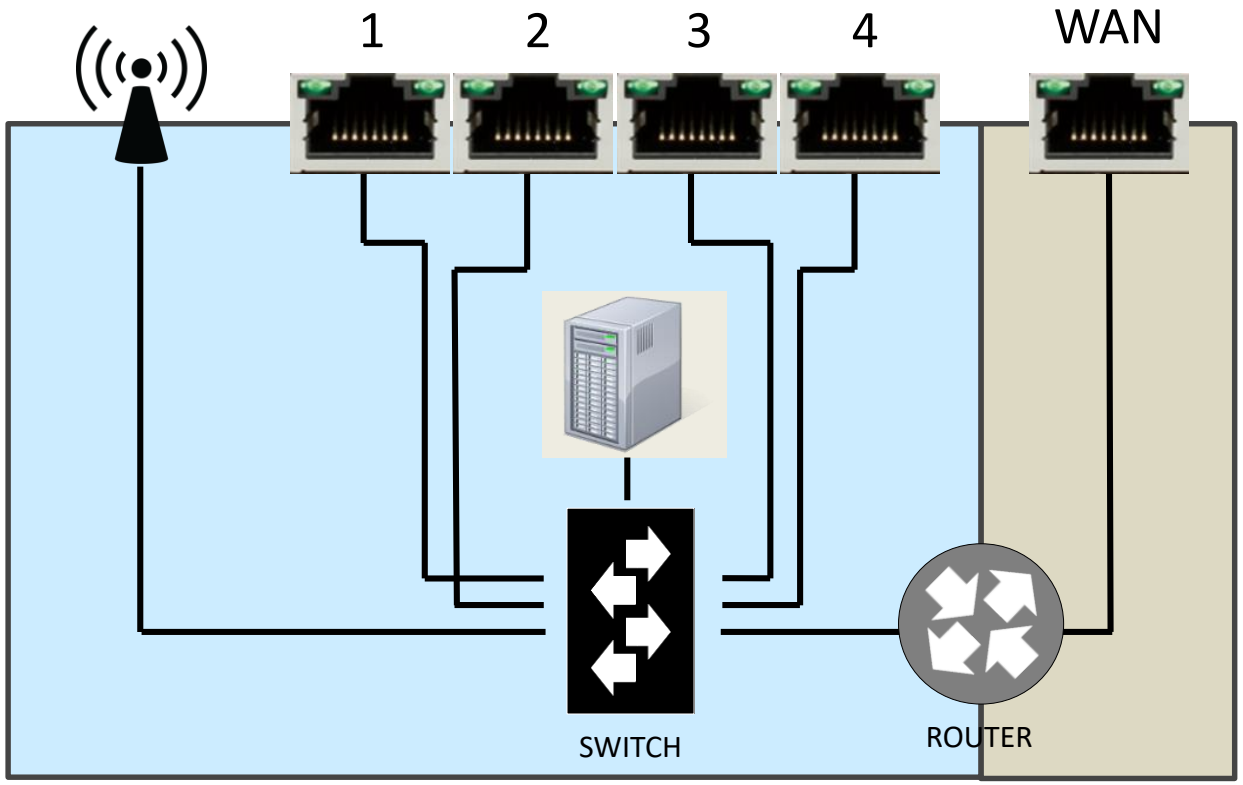
- Less Expensive
- 100% Plug and play
- May not be appropriate in some situations

SWITCH FEATURE RECOMMENDATIONS

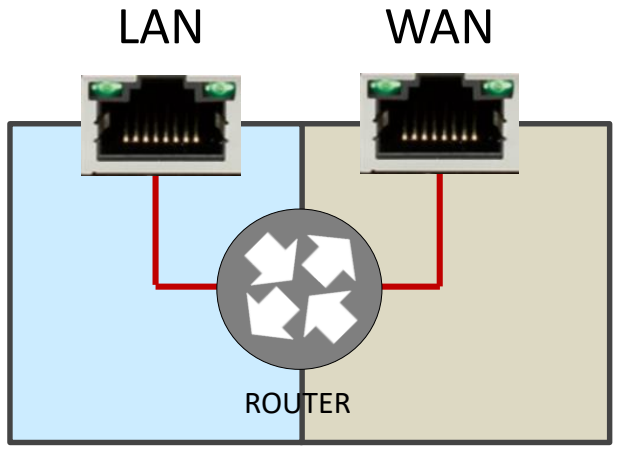
- Know what the default features are
  - Turn off any you will not be needing i.e. Green Ethernet, IGMP
- Do not change settings until there is a problem that a feature may help solve
- Resist temptation to over-configure!
- In most stand-alone Dante networks, features are not required
- Incorrect switch configurations are a common cause of problems!

A “Wireless Router” Serves Many Functions

Typical Home Wireless Router:



Router:



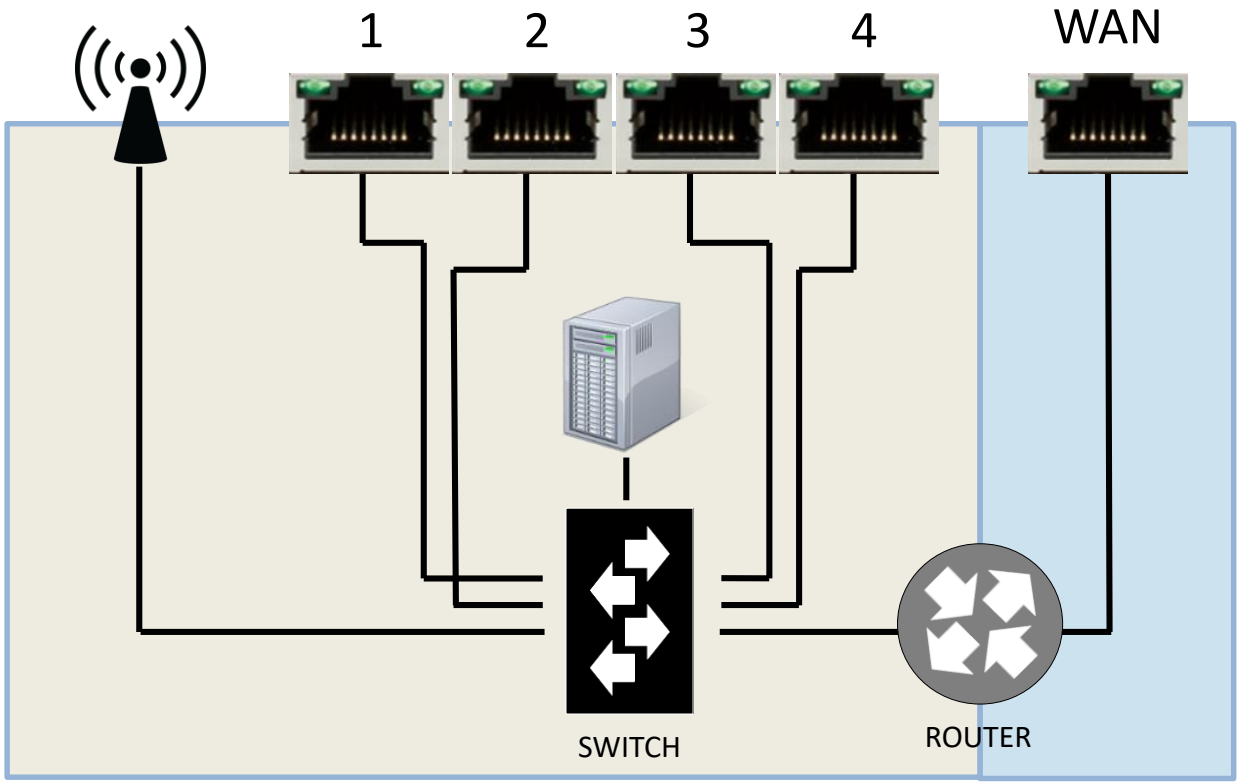
A “Wireless Router” Serves Many Functions

A mixer used to require racks of external gear…

+

DNS Caching

Typical Home Wireless Router:

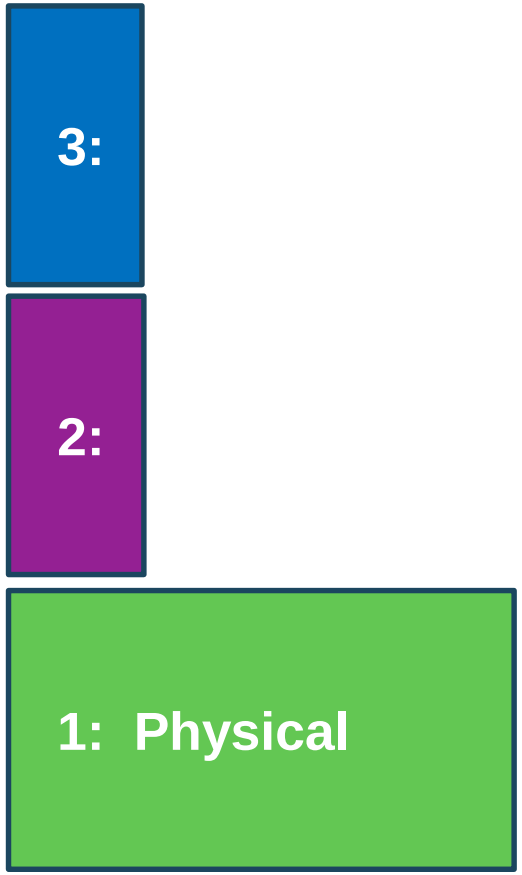


Also Includes:

- DHCP Server
- VPN (Remote Login)
- DNS Resolution & Caching

LAYERED MODELS

OSI Model
(Lowest Three Layers)



Layer 1 refers to the cable and the electrical signal on it.

- Is it plugged in?
- Is the cable broken, problem with impedance, etc?
- Is there electro-magnetic interference on copper?
- Is there light or dirty ends on the fiber optic cable?

LAYERED MODELS

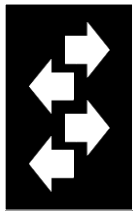
OSI Model
(Lowest Three Layers)

3: Network

2: Datalink

1:

ROUTER



SWITCH

Managed by IP Address

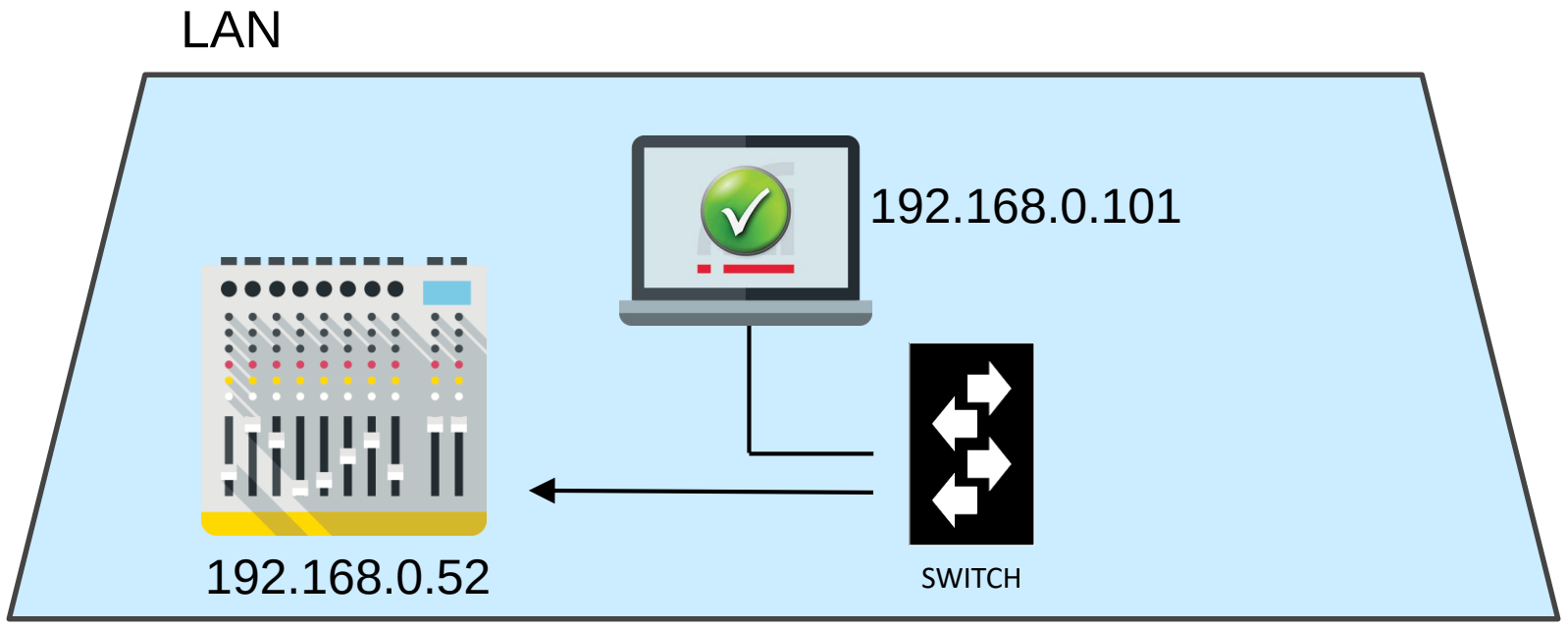
Managed by MAC Address

Core IP Settings: *IP Address, Subnet Mask, Gateway*

IP Address

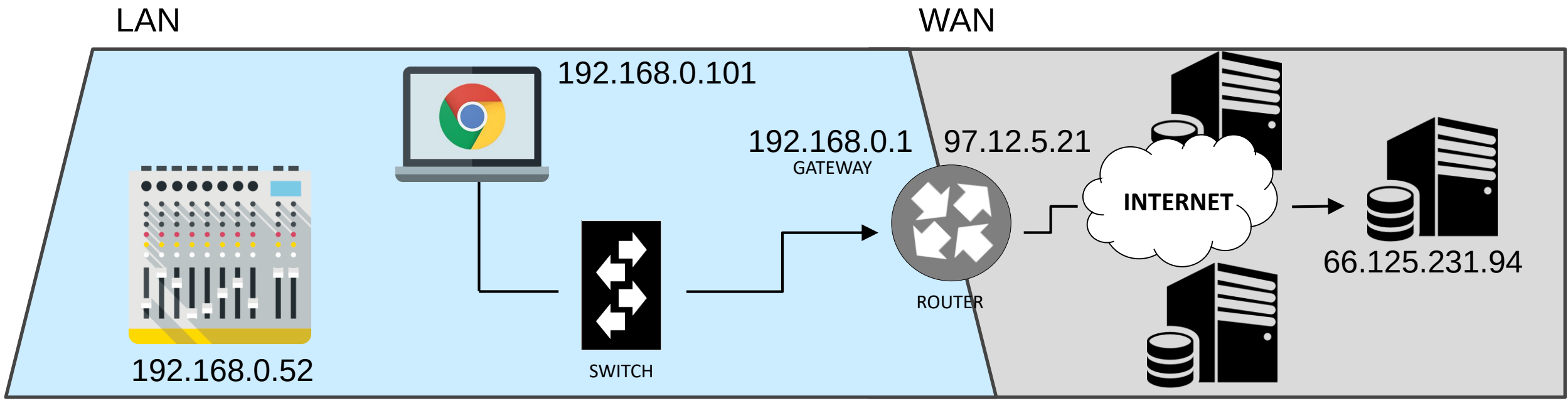
Like a phone number to reach a network device

- Devices on the Local Area Network (LAN) are contacted directly.



Core IP Settings: Gateway (Router)

- Devices on the Local Area Network (LAN) are contacted directly.
- Devices on the Wide Area Network (WAN) are reached through the router.

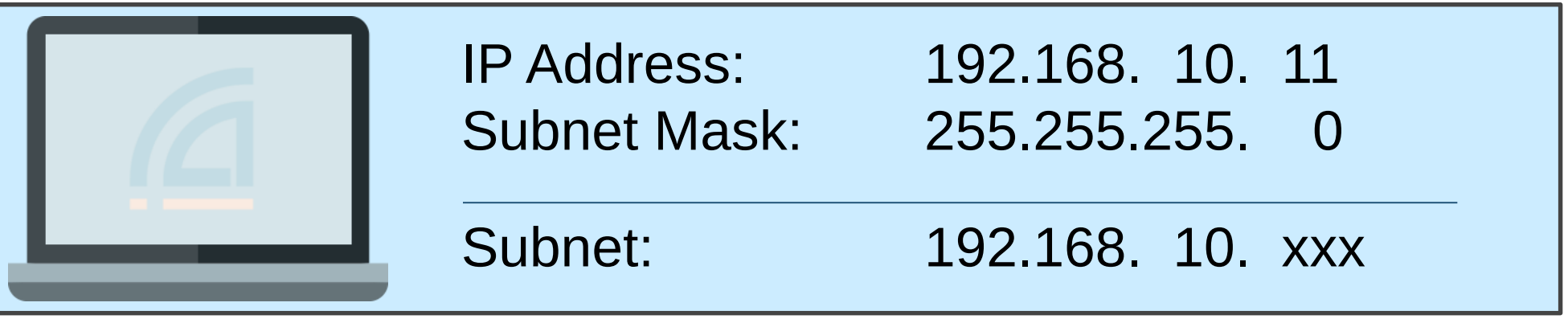


How does a device know to connect on the LAN or through the Gateway (to the WAN)?

IP Address & Subnet Mask

Subnet Mask

- Subnet Mask is not an IP Address
- Subnet Mask indicates the parts of our own IP Address that form our Local Area Network or Subnet
- 255 is a significant field, 0 is a wildcard

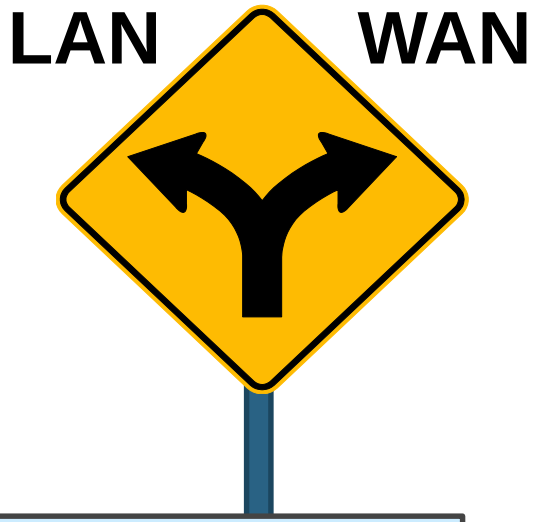


Core IP Settings: Subnet Mask & Gateway

If the Destination is in the LAN:

Access the devices directly on the local network switches

The router is not involved in this connection



Otherwise:

The destination IP address is passed to the Gateway (Router)

Similar to dialing “O” for the operator

IP Address:	192.168. 10. 11
Subnet Mask:	255.255.255. 0
Subnet:	192.168. 10. xxx

Quiz: Subnet Mask

IP Address: 192.168. 10. 11
Subnet Mask: 255.255.255. 0

LAN Range: 192.168. 10. xxx

Are these sought on the LAN or through the Gateway?

192.168.10.18 … LAN

18.231.109.77 … Gateway (WAN)

192.168.1.113 … Gateway (WAN)

Core IP Settings: Subnet Mask

IP Address:	192.168. 10. 11
Subnet Mask:	255.255.255. 0
Subnet:	192.168. 10. xxx

IP Address:	10. 0. 1. 11
Subnet Mask:	255.255.255. 0
Subnet:	10. 0. 1. xxx

Core IP Settings: Subnet Mask

IP Address: 10. 0. 1. 11
Subnet Mask: 255.255.255. 0

Subnet: 10. 0. 1. xxx

IP Address: 10. 0. 1. 11
Subnet Mask: 255.255. 0. 0

Subnet: 10. 0. xxx. xxx

Subnet Mask Values 0, 255

Residential:	255.255.255. 0
Dante Audio Default:	255.255. 0. 0

DSL Static IPs:	255.255.255.248
Corp Network:	255.255.252. 0

Core IP Settings: Subnet Mask

There are 10 types of people in the world:

Binary	Decimal
0	0
1	1
10	**2**
11	3

those who understand binary, and those who don’t.

Core IP Settings: 32-bit Addresses

We call this “dotted-decimal notation”.

192	.	168	.	1	.	12
1100 0000	.	1010 1000	.	0000 0001	.	0000 1100

Dotted Decimal Notation: 192.168.1.12

Value Range of Each Field: 0 – 255 (8 bits)

4 fields x 8 bits each: 32-bit address

Core IP Settings: 32-bit Addresses

IP Address and Subnet Mask are 32-bit numbers.
Subnet Mask defines significant binary digits.

192 1100 0000	168 1010 1000	1 0000 0001	12 0000 1100
255 1111 1111	255 1111 1111	255 1111 1111	0 0000 0000
192 1100 0000	168 1010 1000	1 0000 0001	x xxxx xxxx

Core IP Settings: Subnet Mask Length

This subnet setting is commonly abbreviated:

192.168.1.12 /24

192	168	1	12
1100 0000	1010 1000	0000 0001	0000 1100
255	255	255	0
1111 1111	1111 1111	1111 1111	0000 0000
192	168	1	x
1100 0000	1010 1000	0000 0001	xxxx xxxx

Core IP Settings: Subnet Mask Length

You can break the mask “mid-field”:

192.168.0.12 /22

192 1100 0000	168 1010 1000	1 0000 0001	12 0000 1100
255 1111 1111	255 1111 1111	252 1111 1100	0 0000 0000
192 1100 0000	168 1010 1000	0-3 0000 00xx	x xxxx xxxx

Core IP Settings: Subnet Mask Length

You can break the mask “mid-field”:

192.168.26.12 /22

192	168	26	12
1100 0000	1010 1000	0001 1010	0000 1100
255	255	252	0
1111 1111	1111 1111	1111 1100	0000 0000
192	168	24-27	x
1100 0000	1010 1000	0001 10xx	xxxx xxxx

Core IP Settings: Subnet Mask Length

The Subnet Mask has a Length.

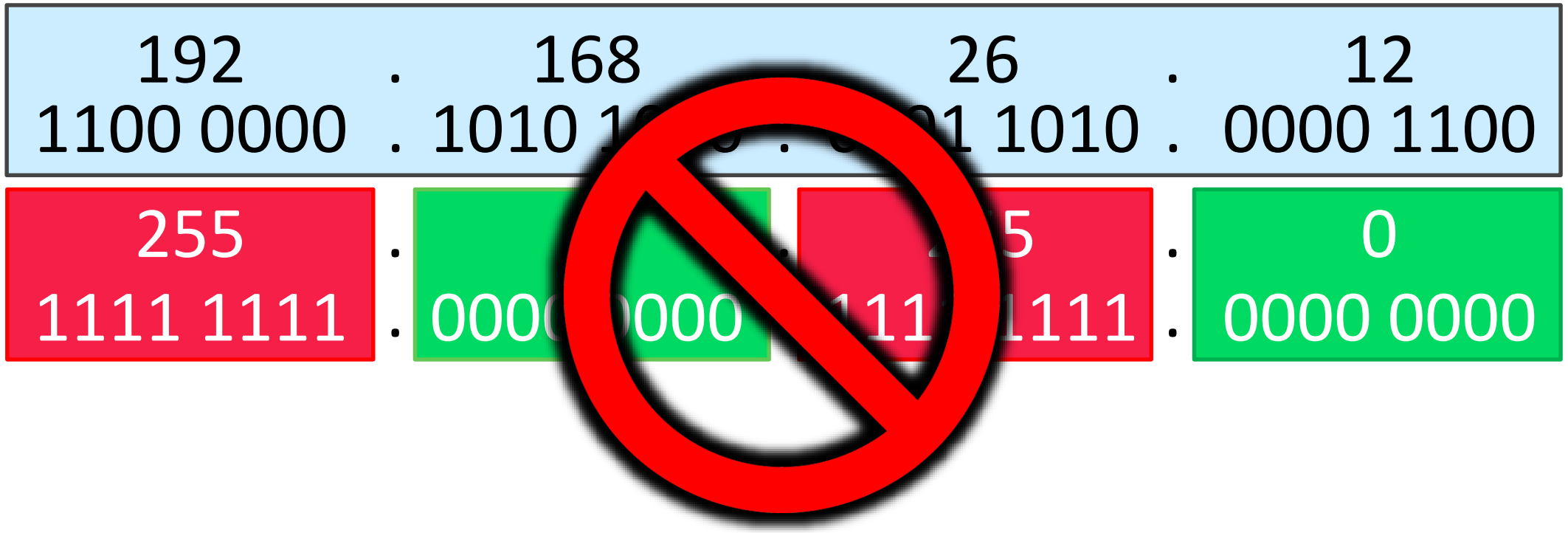
A String of Binary 1's, then Binary 0's.

192	.	168	.	26	.	12
1100 0000	.	1010 1000	.	0001 1010	.	0000 1100
255	.	255	.	255	.	0
1111 1111	.	1111 1111	.	1111 1111	.	0000 0000

Core IP Settings: Subnet Mask Length

The Subnet Mask has a Length.

A String of Binary 1's, then Binary 0's.



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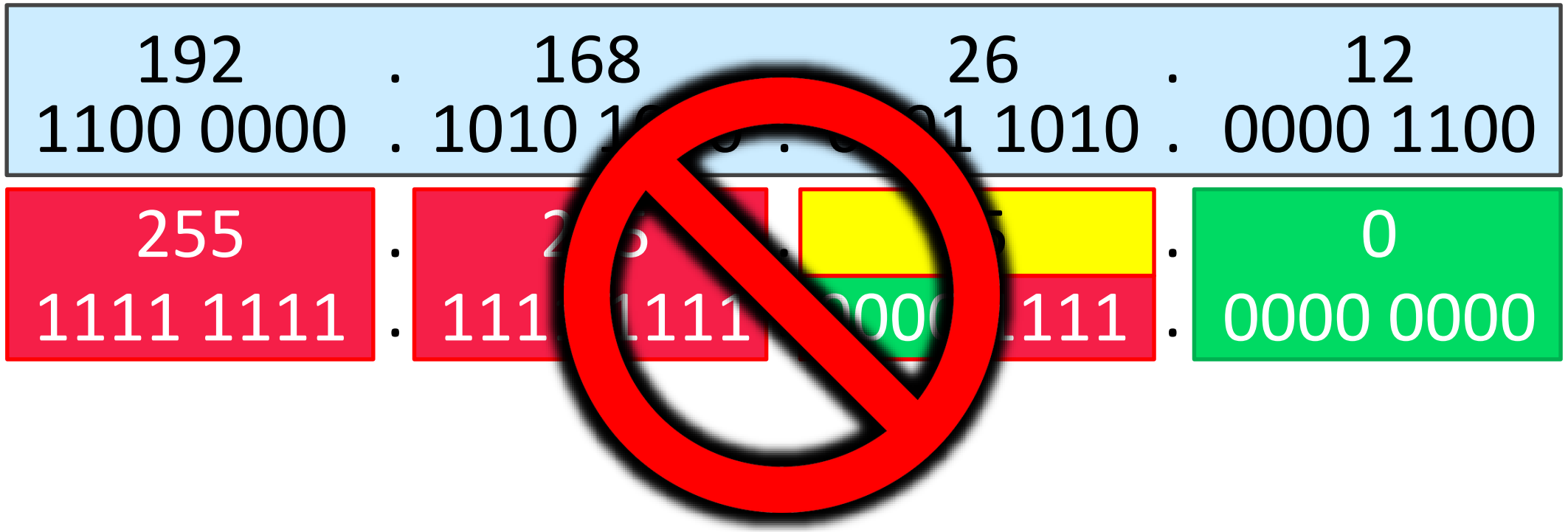


Core IP Settings: Subnet Mask Valid Values

Mask	Binary Value								Answers
255	1	1	1	1	1	1	1	1	1
254	1	1	1	1	1	1	1	0	2
252	1	1	1	1	1	1	0	0	4
248	1	1	1	1	1	0	0	0	8
240	1	1	1	1	0	0	0	0	16
224	1	1	1	0	0	0	0	0	32
192	1	1	0	0	0	0	0	0	64
128	1	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	256

Private IP Addresses

Non Public Routable IP Addresses

These are non public Internet routable IP address ranges.

IP Address Range:	Common Uses
192.168.___.___	
10.___.___.___	
172.16-31.___.___	Dante Secondary (172.31.x.x)
169.254.___.___	Link Local, Dante Primary

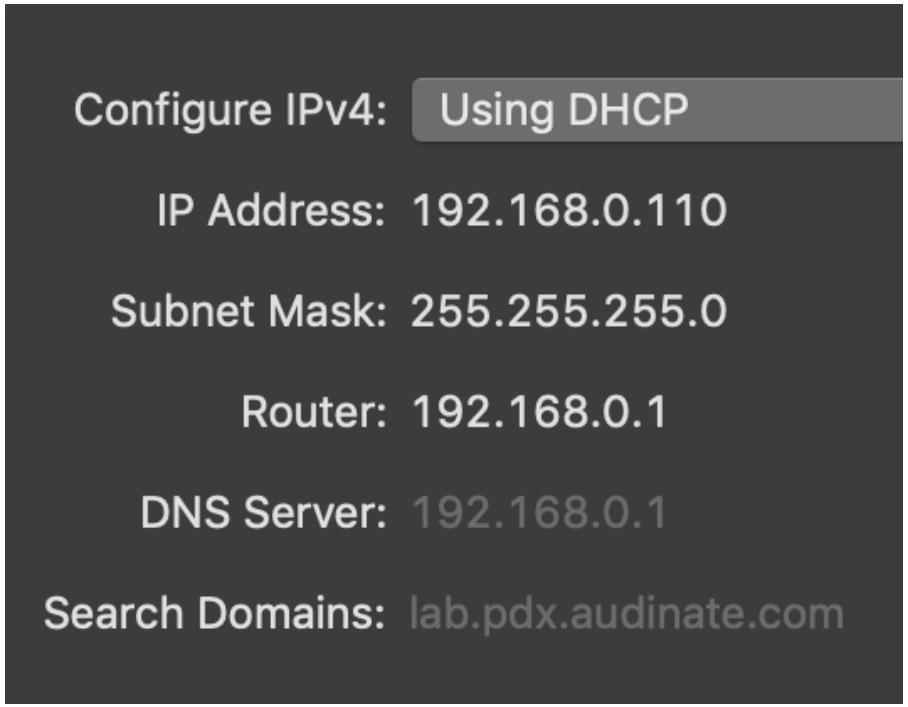
Addresses to Avoid

Avoid these addresses – they often have meaning.

IP Address Range:	Common Uses
___.___.___. **0**	Network Identifier
___.___.___. **1**	Commonly Used For Router or Network Infrastructure
___.___.___**.254**	
___.___.___**.255**	Broadcast Address

Automatic IP Addressing: *DHCP & Link Local*

Automatic IP Addressing: DHCP



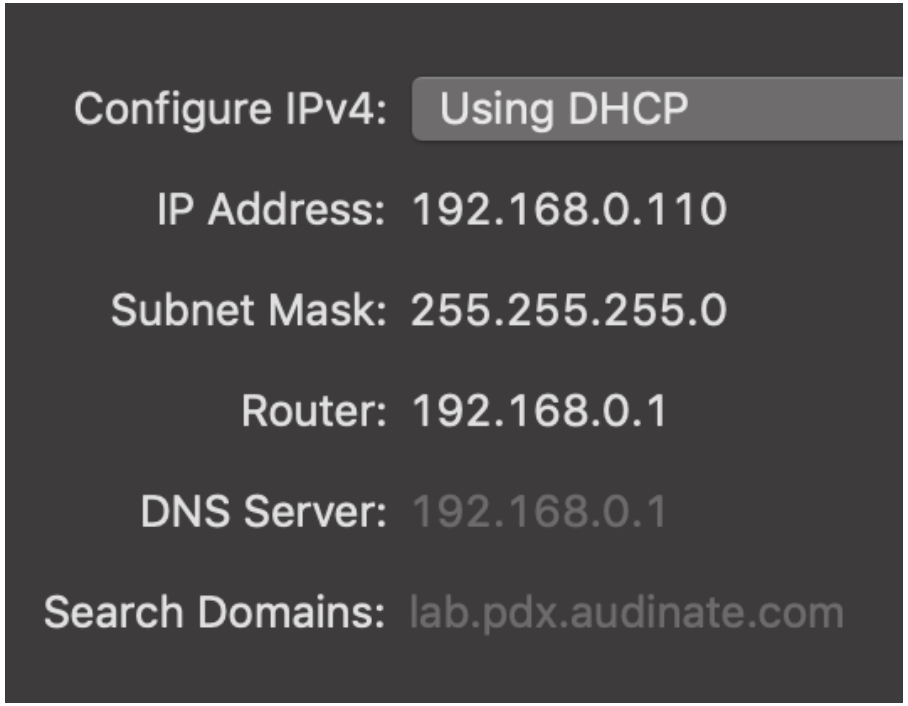
DHCP Automatically Assigns:

- IP Address — Different on each device

- Subnet Mask
- Gateway
- DNS

} The same on all devices

Automatic IP Addressing: DHCP



DHCP Settings:

IP Range: IP addresses to hand out:

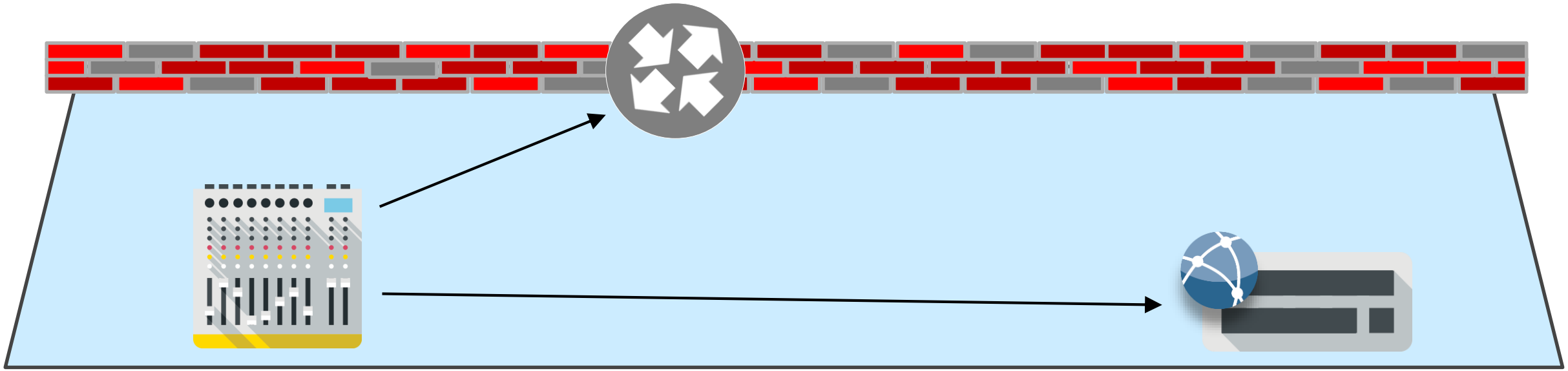
192.168.0. 100 to
192.168.0. 254

DHCP Lease Time: Configuration “Time to Live”:

e.g. – 24 hours

Automatic IP Addressing: DHCP

IP	MAC	Expiration

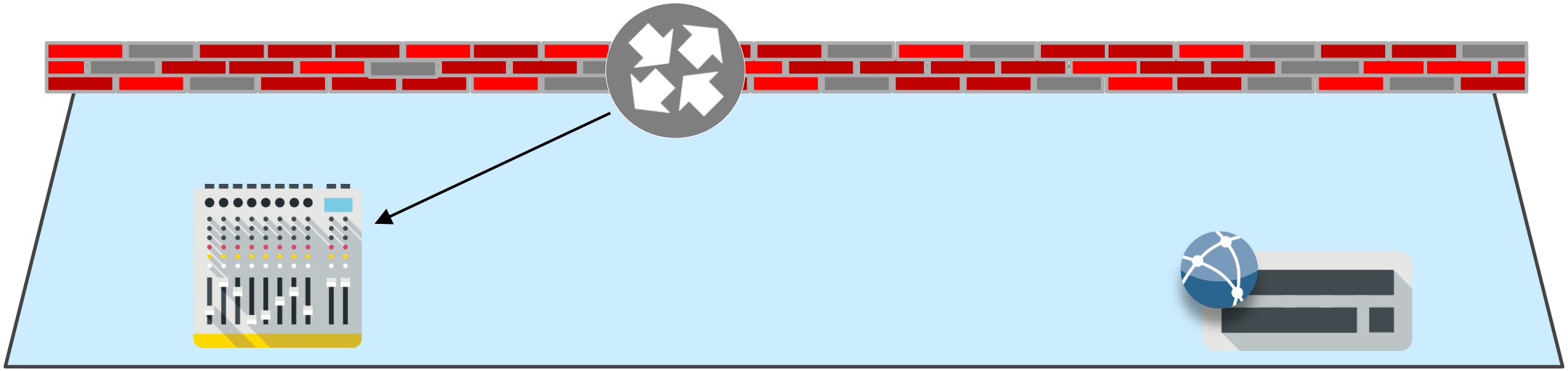


?

.3 - Static

Automatic IP Addressing: DHCP

IP	MAC	Expiration
.101	F7.51.32.CB.4F.21	2019-06-19 09:30



.101 – 9:30am

.3 - Static

Automatic IP Addressing: DHCP

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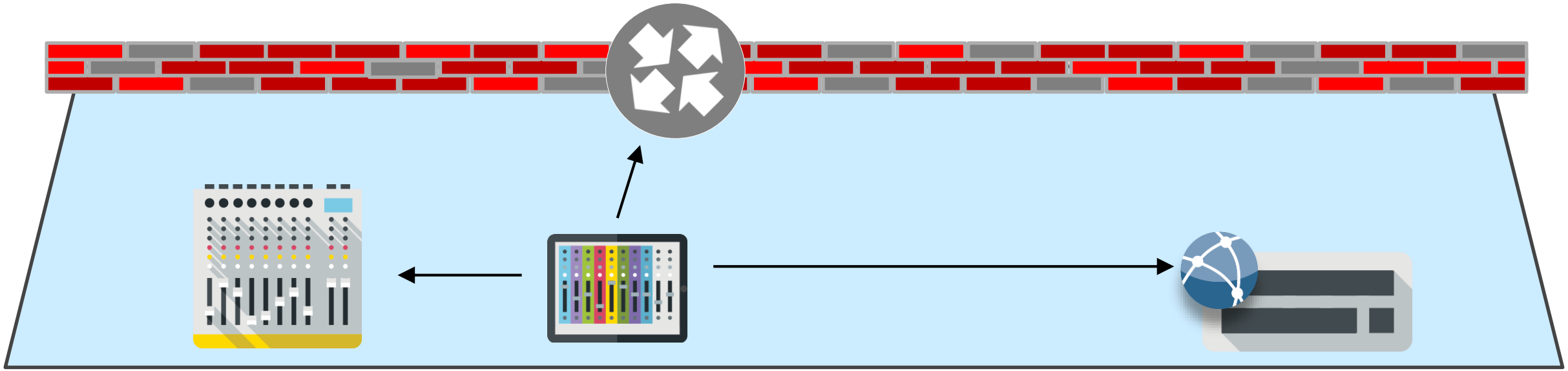
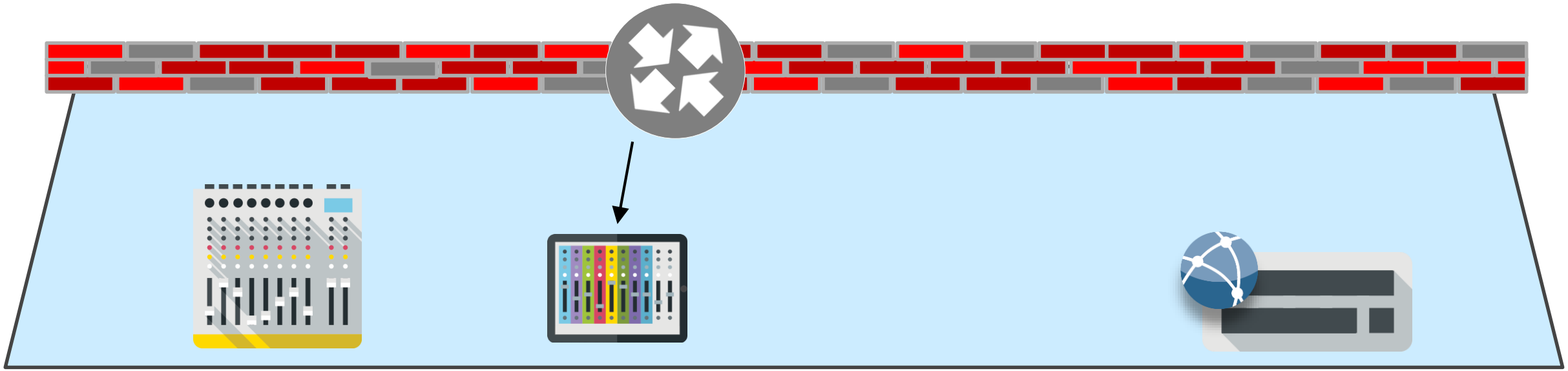


.101 – 9:30am ? .3 - Static

Automatic IP Addressing: DHCP

IP	MAC	Expiration
.101	F7.51.32.CB.4F.21	2019-06-19 09:30
.102	44.DC.24.B4.11.96	2019-06-19 09:40



.101 – 9:30am

.102 – 9:40am

.3 - Static

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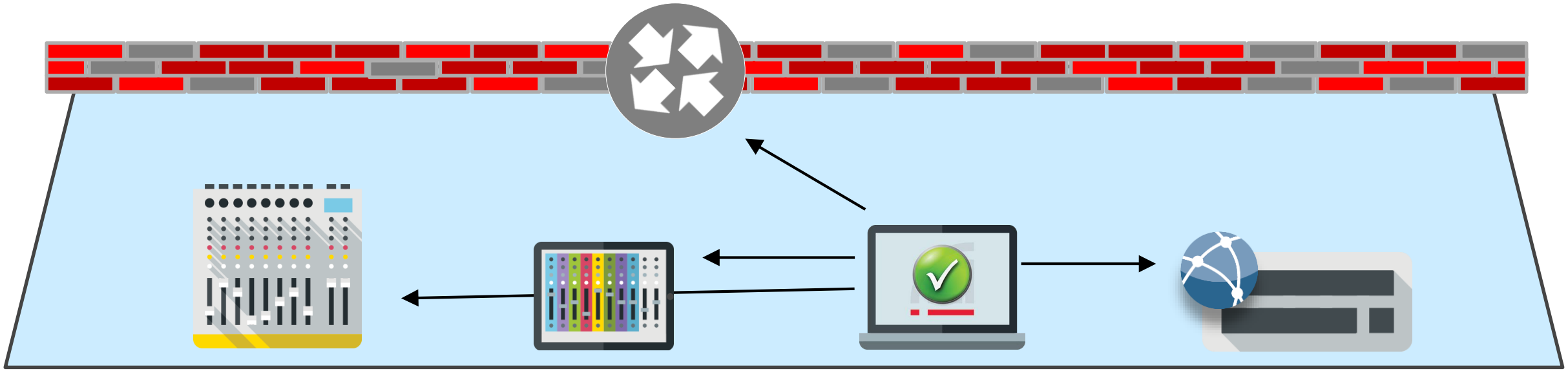
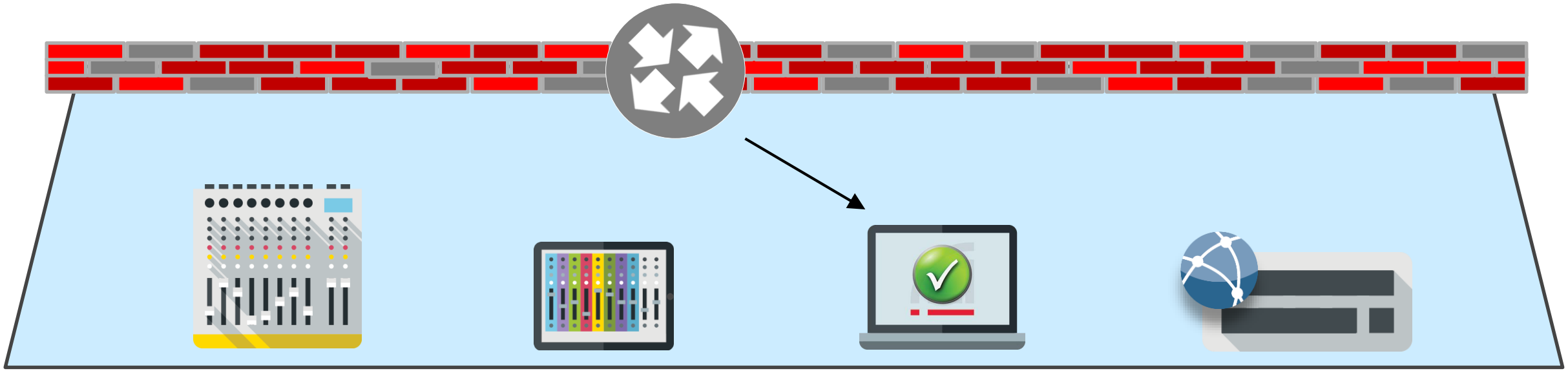


.101 – 9:30am .102 – 9:40am ? .3 - Static

Automatic IP Addressing: DHCP

IP	MAC	Expiration
.101	F7.51.32.CB.4F.21	2019-06-19 09:30
.102	44.DC.24.B4.11.96	2019-06-19 09:40
.103	B3.55.E1.7C.BA.D3	2019-06-19 09:45



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Automatic IP Addressing: DHCP

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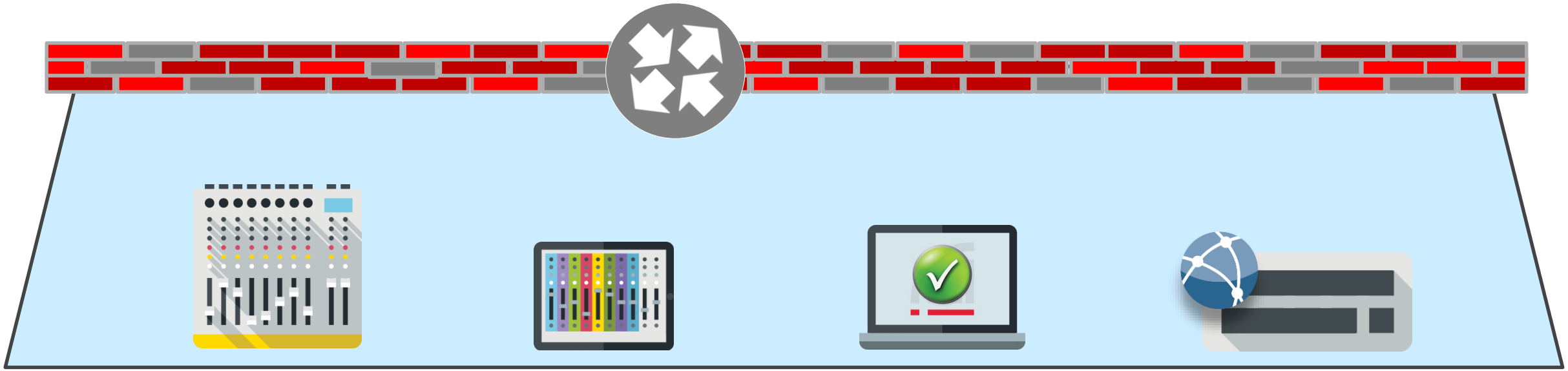

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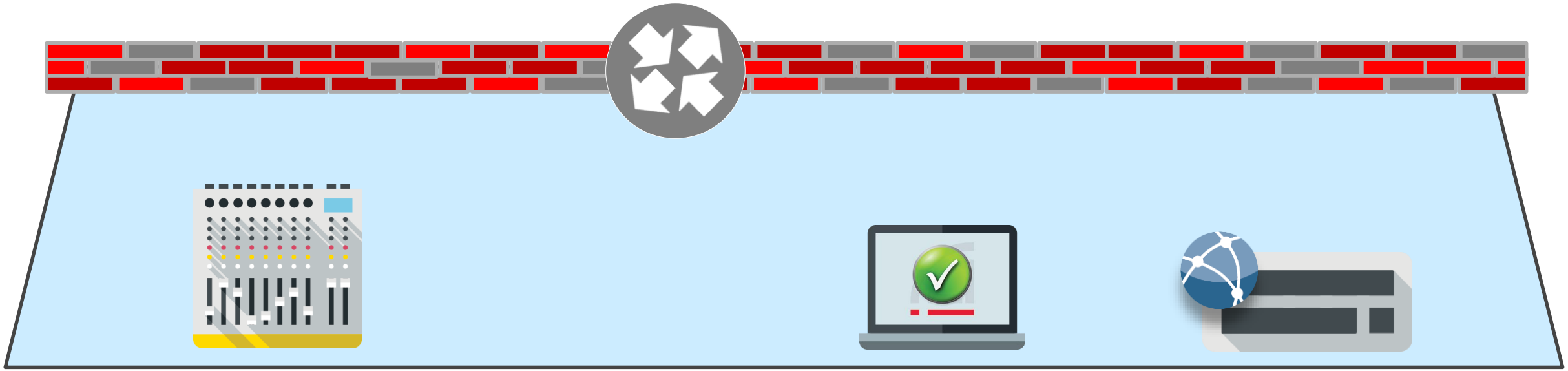

.101 – 9:30am

.103 – 9:45am

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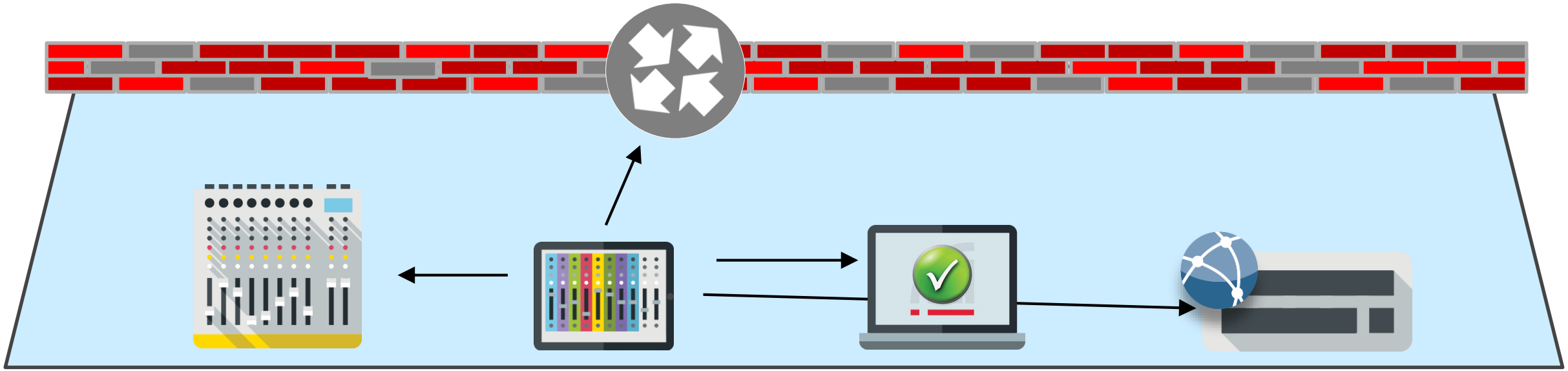

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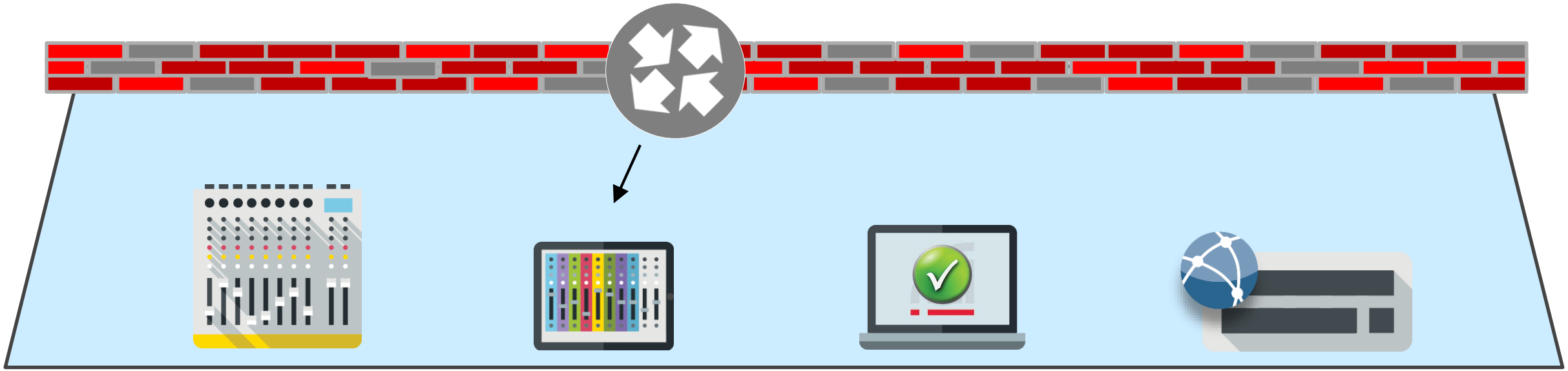
IP	MAC	Expiration
.101	F7.51.32.CB.4F.21	2019-06-19 09:30
.102	44.DC.24.B4.11.96	2019-06-19 **13:05**
.103	B3.55.E1.7C.BA.D3	2019-06-19 09:45



.101 – 9:30am .102 – 1:05pm .103 – 9:45am .3 - Static

Automatic IP Addressing: DHCP

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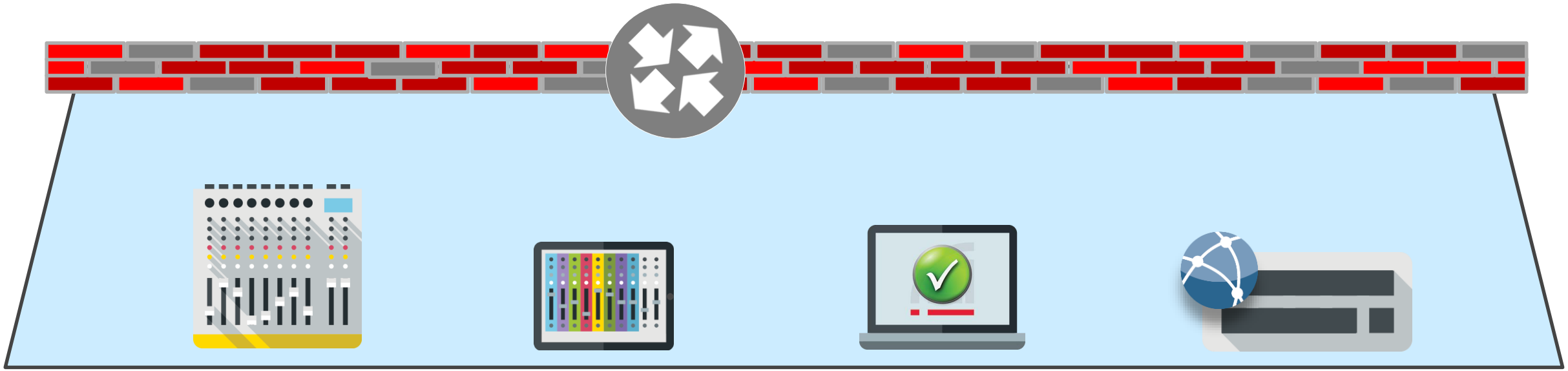

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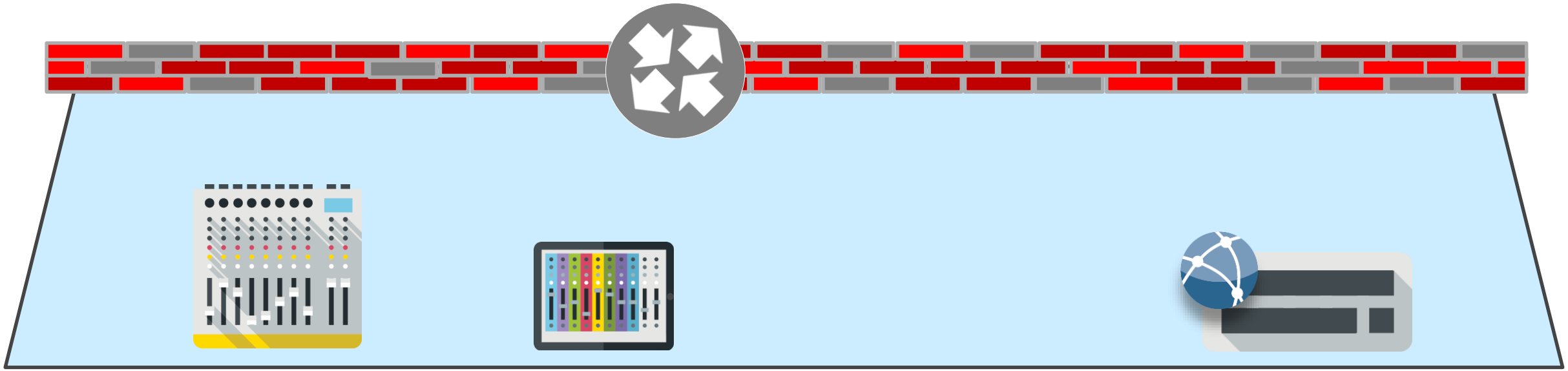

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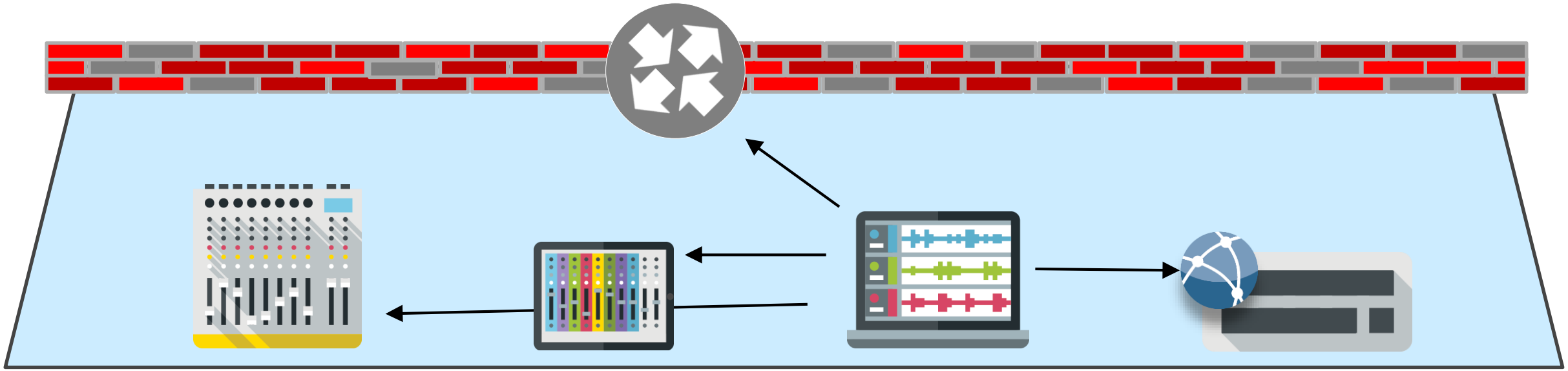

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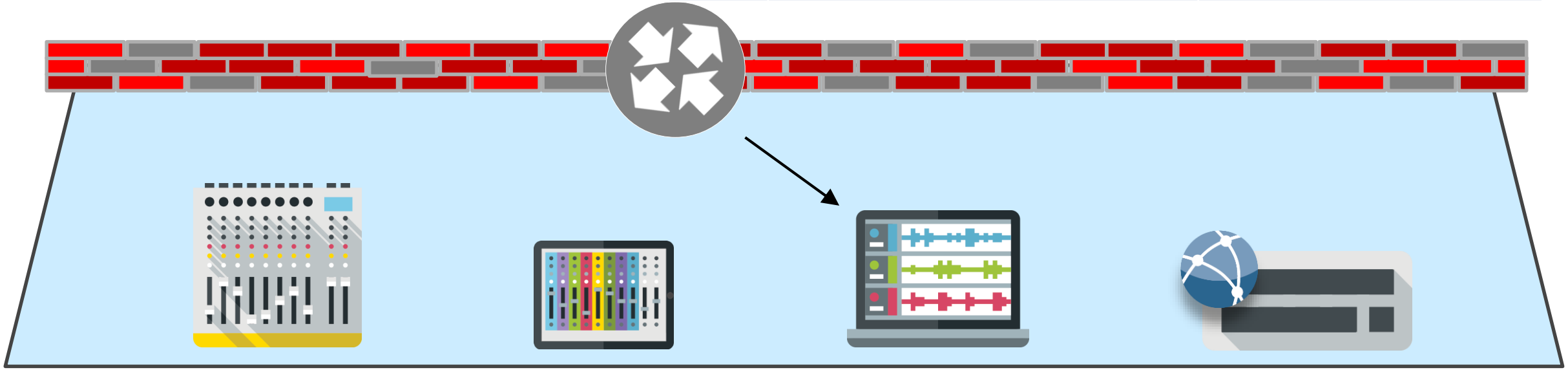
.103	B3.55.E1.7C.BA.D3	2019-06-19 09:45
.104	A4.45.BC.D3.59.19	2019-06-19 15:10



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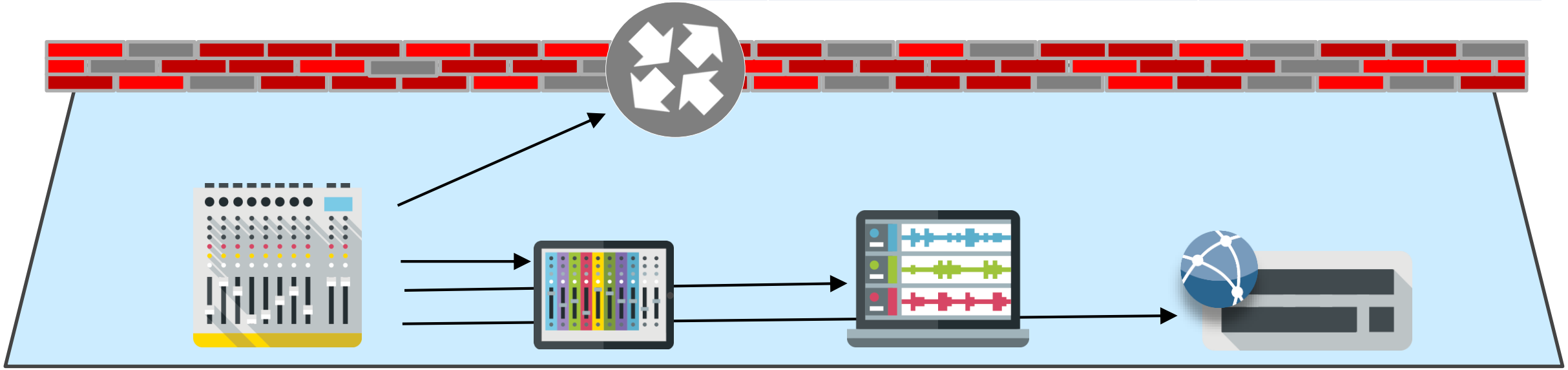

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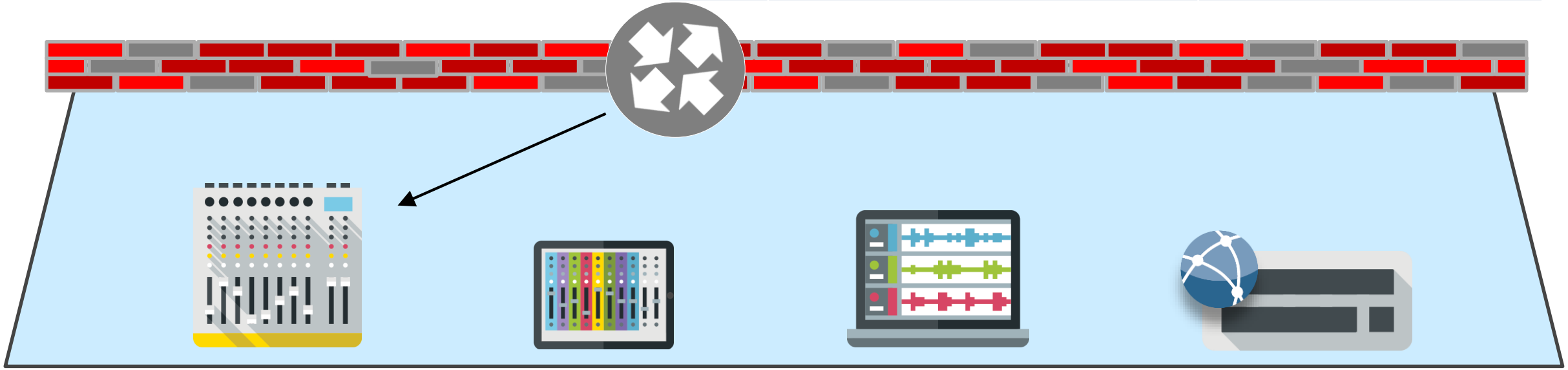
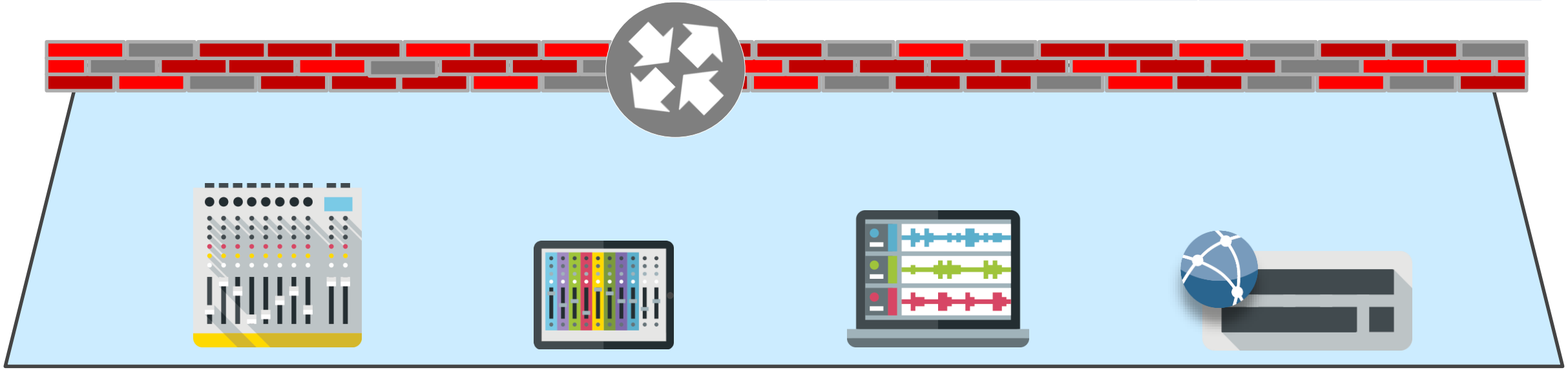
.103	B3.55.E1.7C.BA.D3	2019-06-19 09:45
.104	A4.45.BC.D3.59.19	2019-06-19 15:10



.101 – 9:30am .102 – 1:05pm .104 – 3:10pm .3 - Static

Automatic IP Addressing: DHCP

IP	MAC	Expiration
.101	F7.51.32.CB.4F.21	**2019-06-20** 09:30
.102	44.DC.24.B4.11.96	2019-06-19 13:05
.103	B3.55.E1.7C.BA.D3	2019-06-19 09:45
.104	A4.45.BC.D3.59.19	2019-06-19 15:10



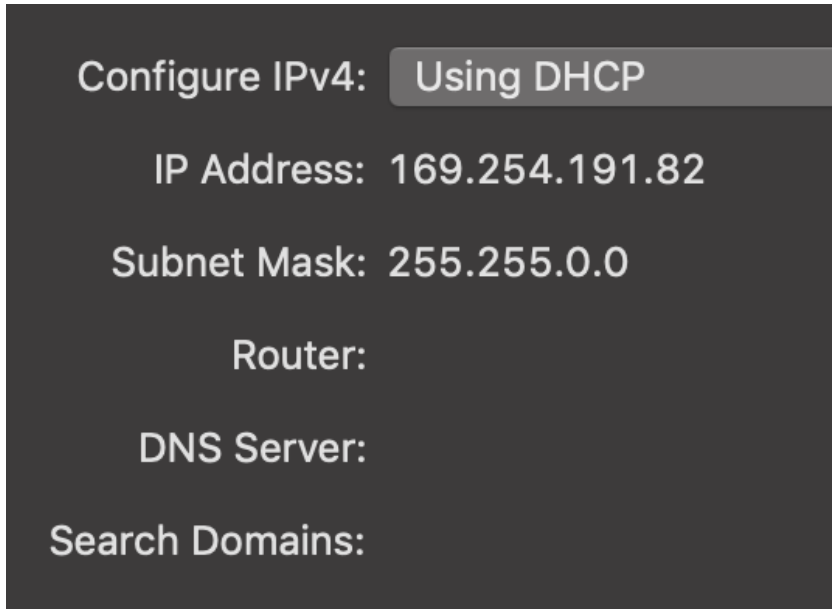
.101 – 9:30am .102 – 1:05pm .104 – 3:10pm .3 - Static

Automatic IP Addressing: DHCP

What if there is no DHCP Server?

Most Devices Revert to “Link Local”

Automatic IP Addressing: Link Local



Link Local Automatically Assigns:

- IP Address
- Subnet Mask

} 169.254.0.0 /16

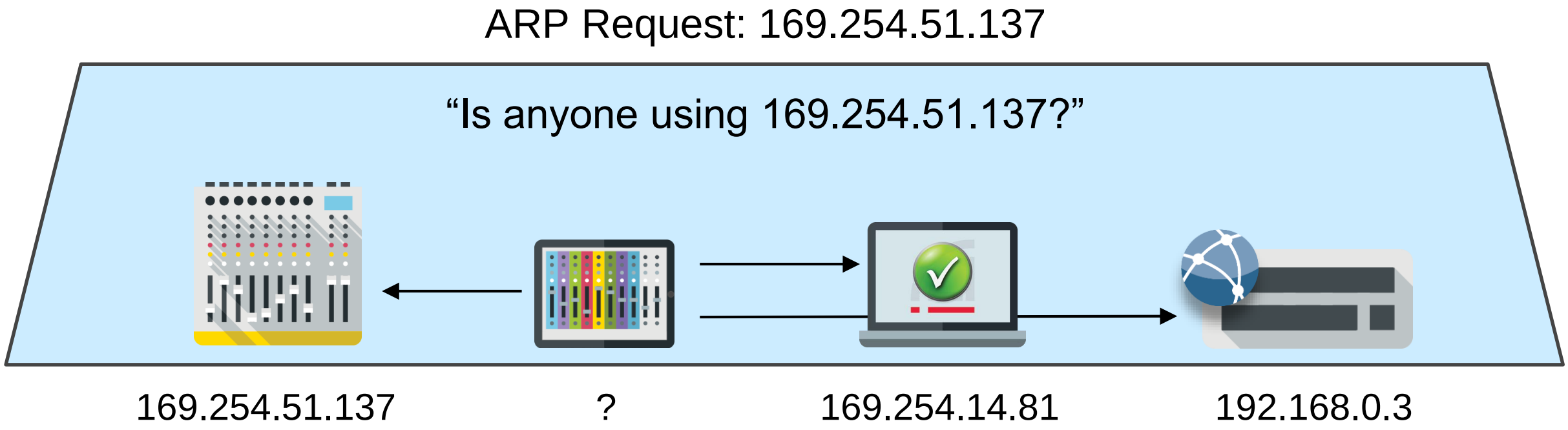
169.254.__.__
255.255. 0 . 0

The goal is to allow devices to communicate on a LAN.

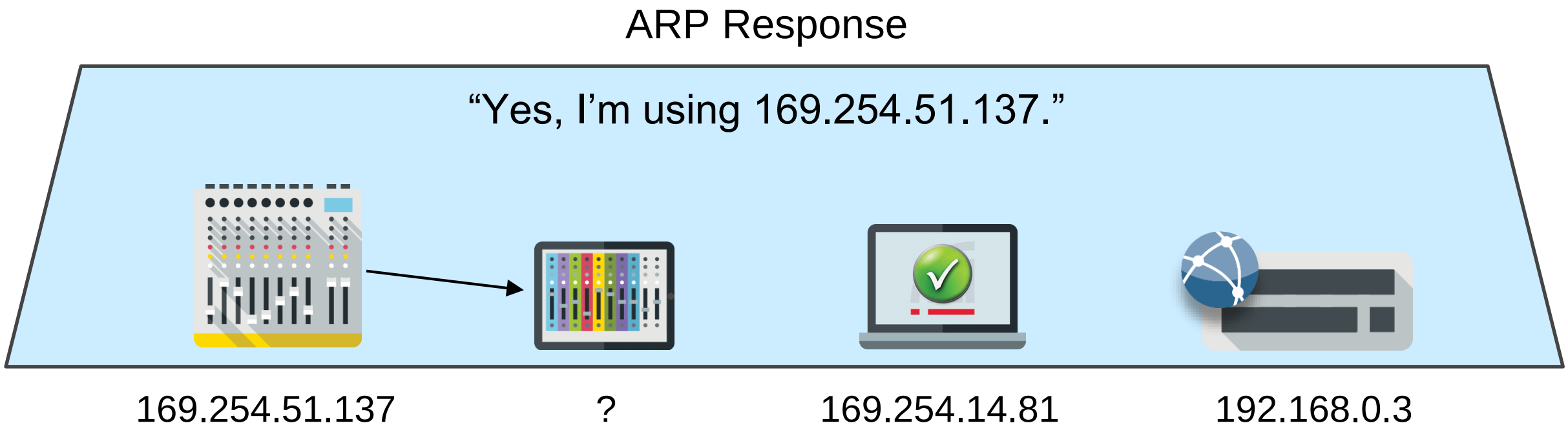
Link Local Does Not Deal With:

- Gateway
- DNS

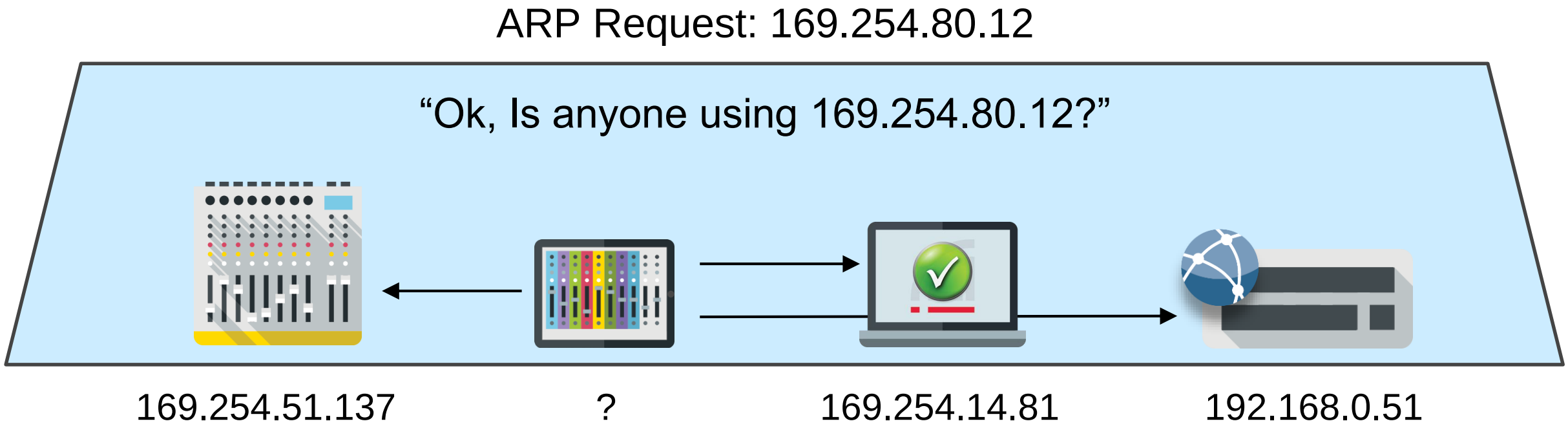
Link Local Looks Like This…



Link Local Looks Like This…

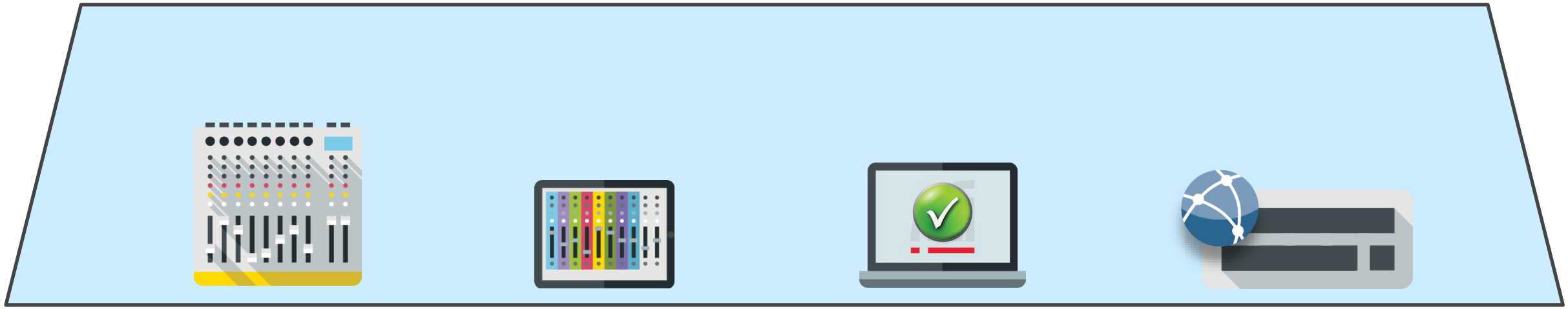


Link Local Looks Like This…



Automatic IP Addressing: DHCP

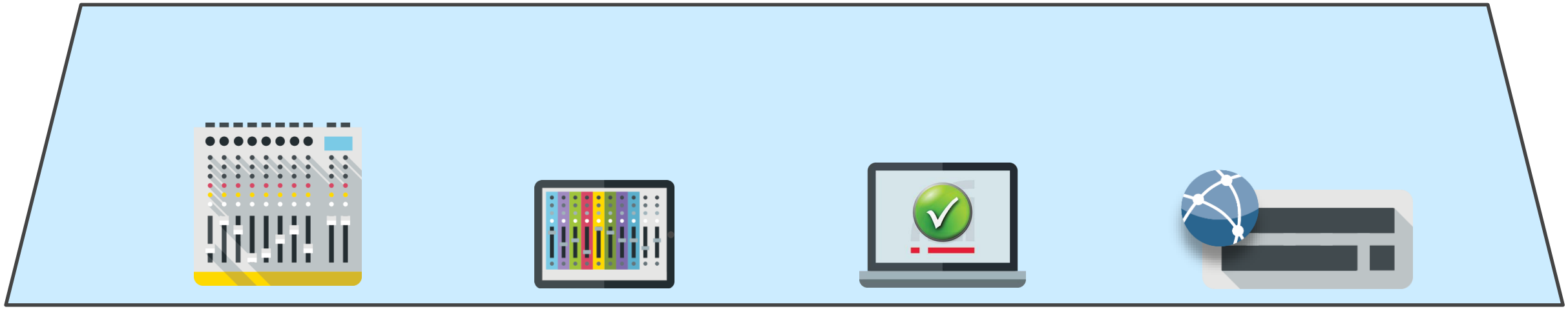
Link Local Looks Like This…



169.254.51.137 ? 169.254.14.81 192.168.0.51

Automatic IP Addressing: DHCP

Link Local Looks Like This…

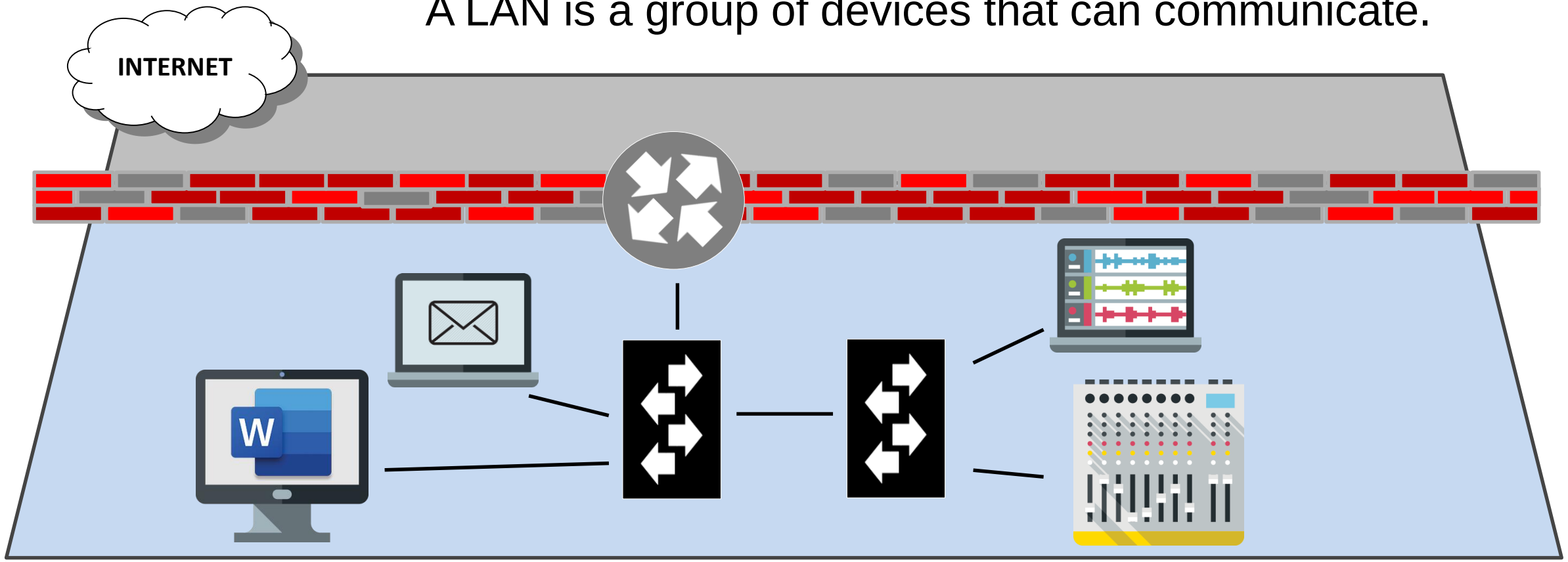


169.254.51.137 169.254.80.12 169.254.14.81 192.168.0.51

Topology: *LAN, VLAN, Uplinks/Trunks*

What is a LAN?

A LAN is a group of devices that can communicate.



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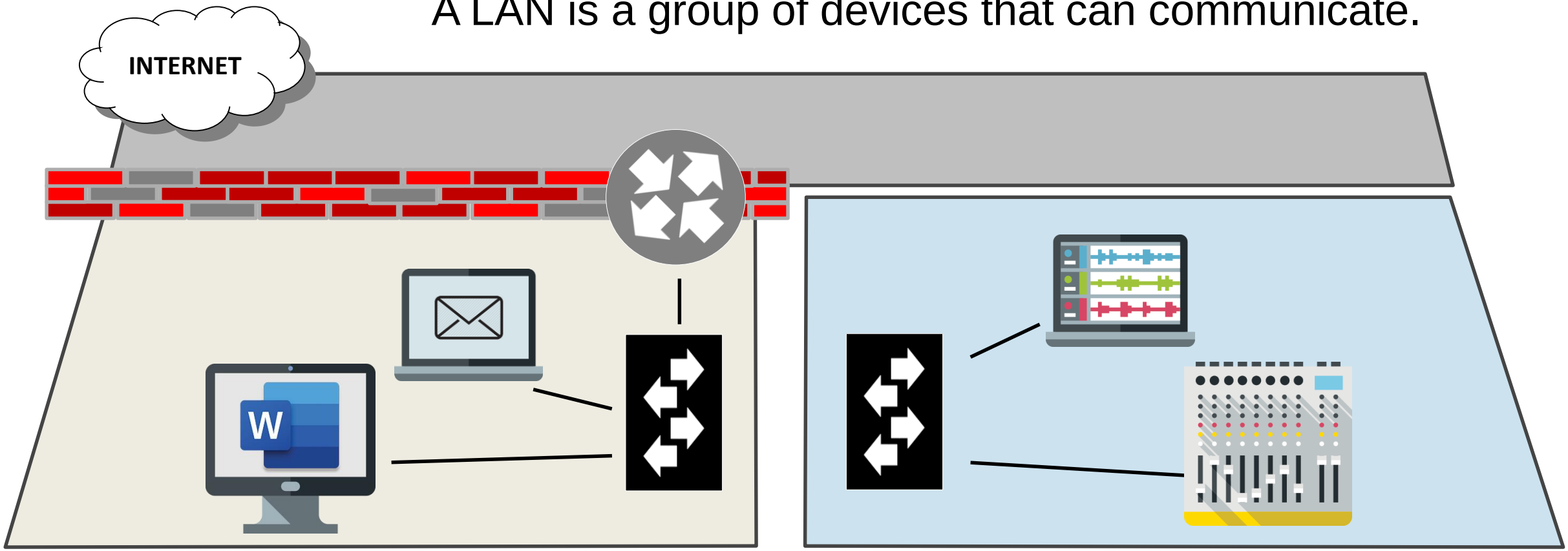
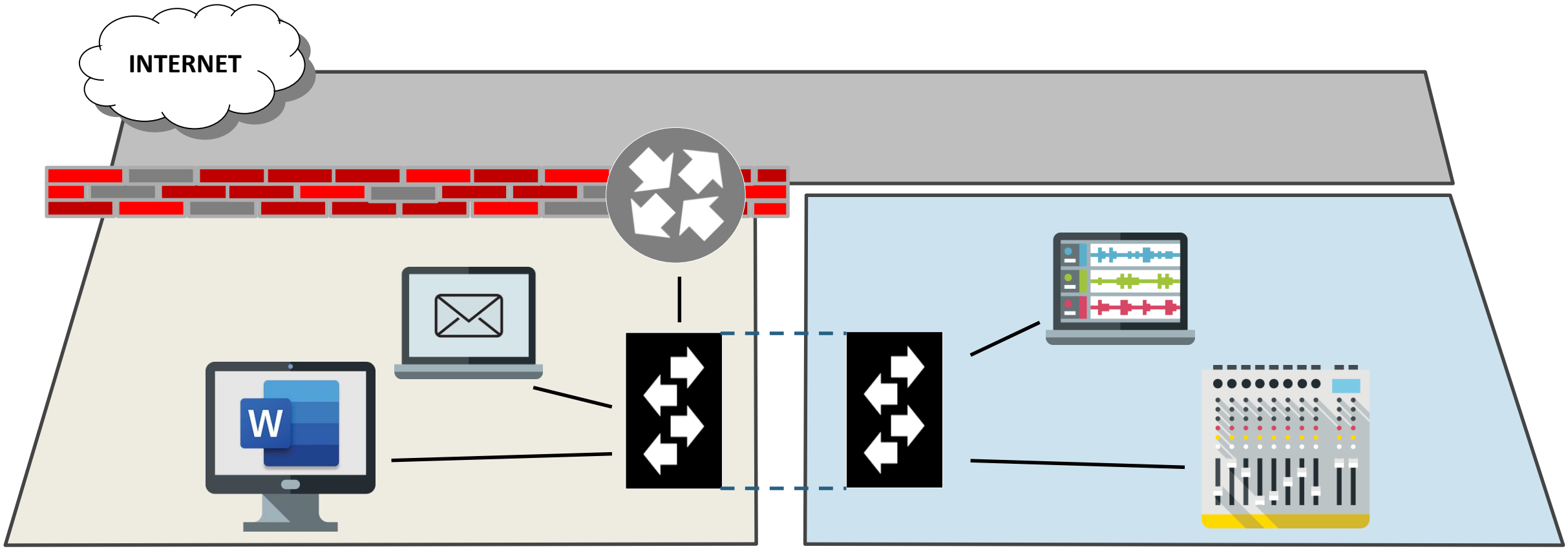


What is a VLAN?

A VLAN simulates isolated networks in one switch

You do not have to offer the same number of ports per VLAN – you can assign the quantity you need.

What is a VLAN?

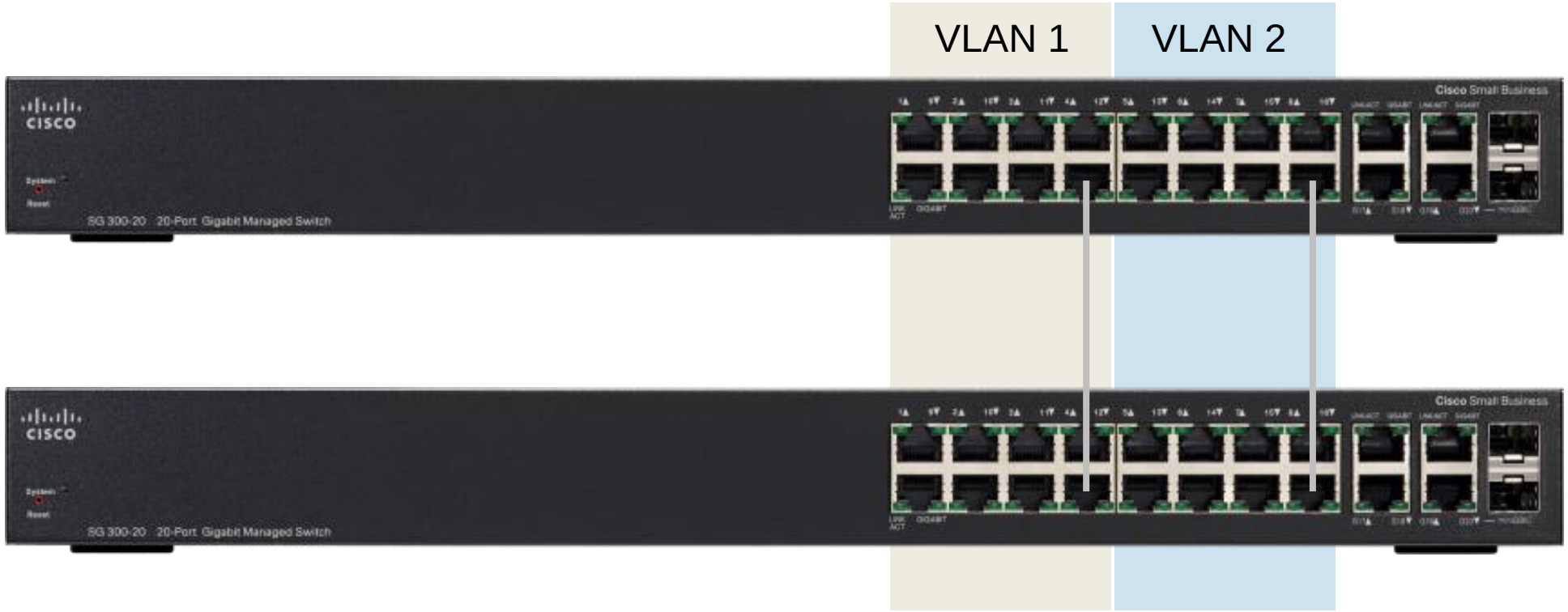


What is a Trunk?

A Trunk Line is a link Between Switches

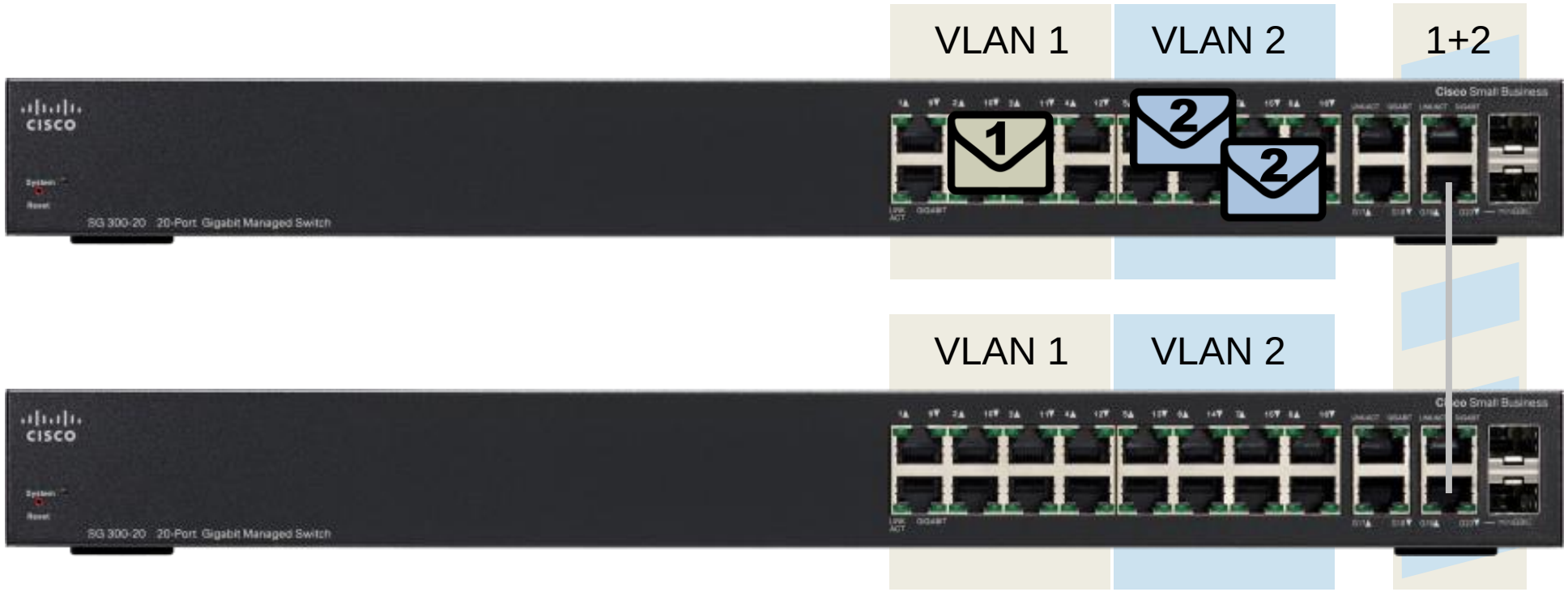
Multiple VLANs on a Trunk

Can we do this?

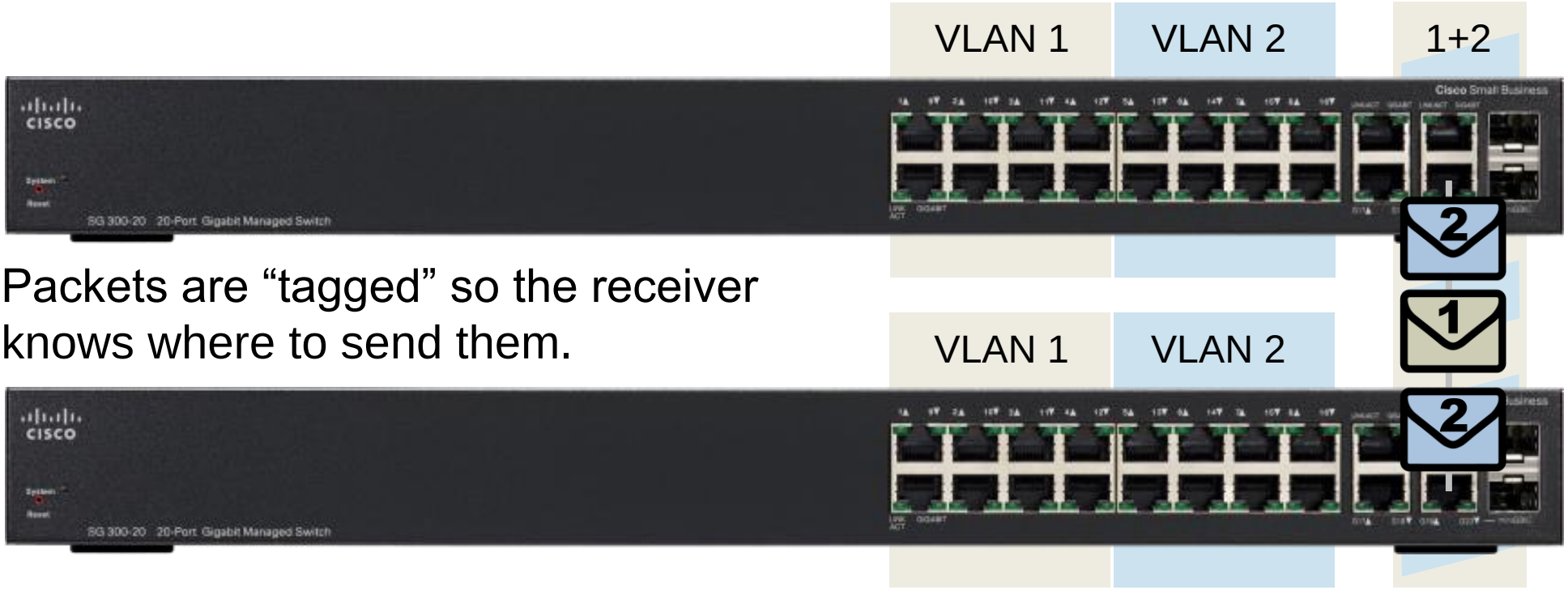


Multiple VLANs on a Trunk

Nope - We Create a Trunk with Tagged VLANs

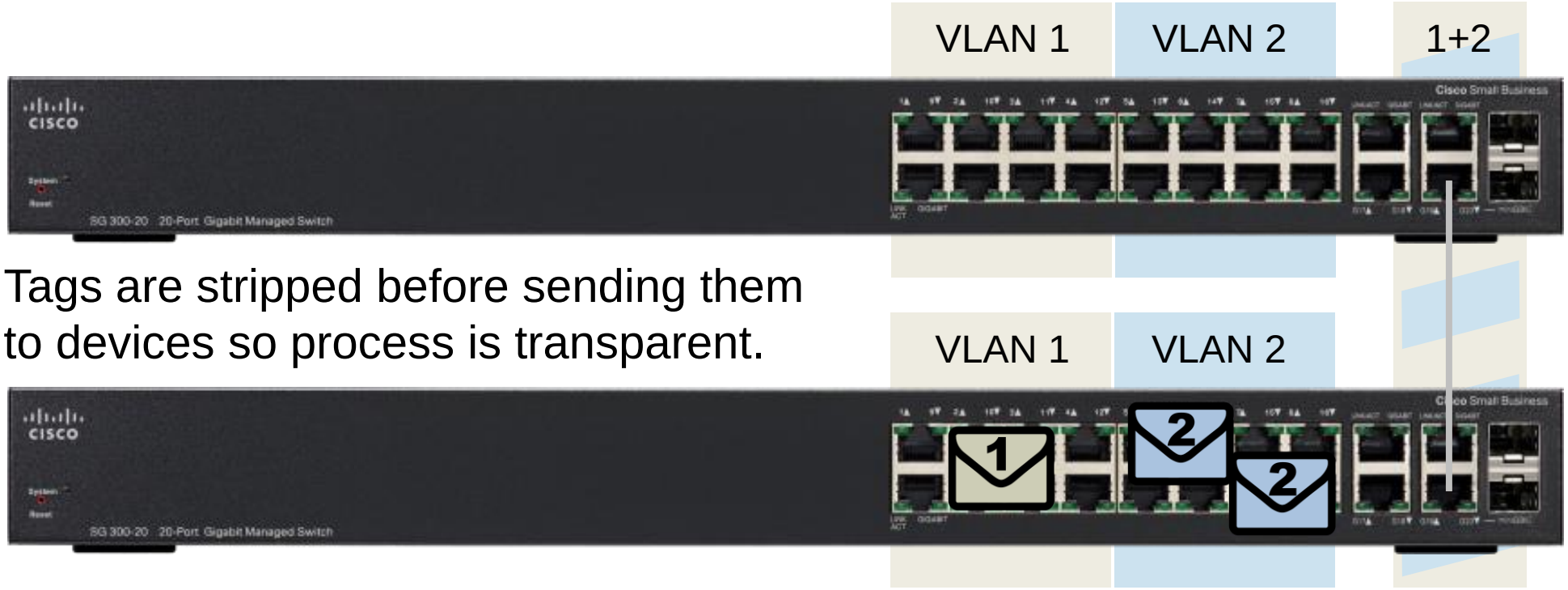


Create a Trunk with Tagged VLANs



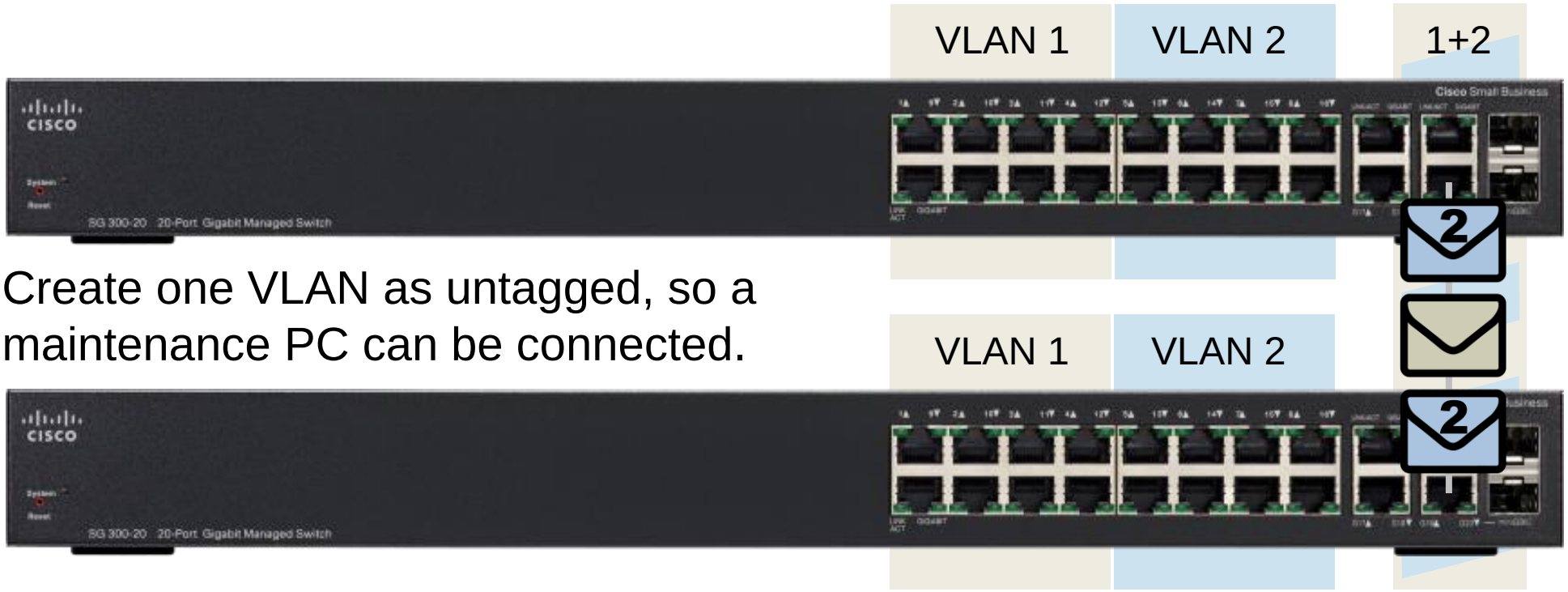
Packets are “tagged” so the receiver knows where to send them.

Create a Trunk with Tagged VLANs



Tags are stripped before sending them to devices so process is transparent.

The “Untagged” VLAN on a Trunk

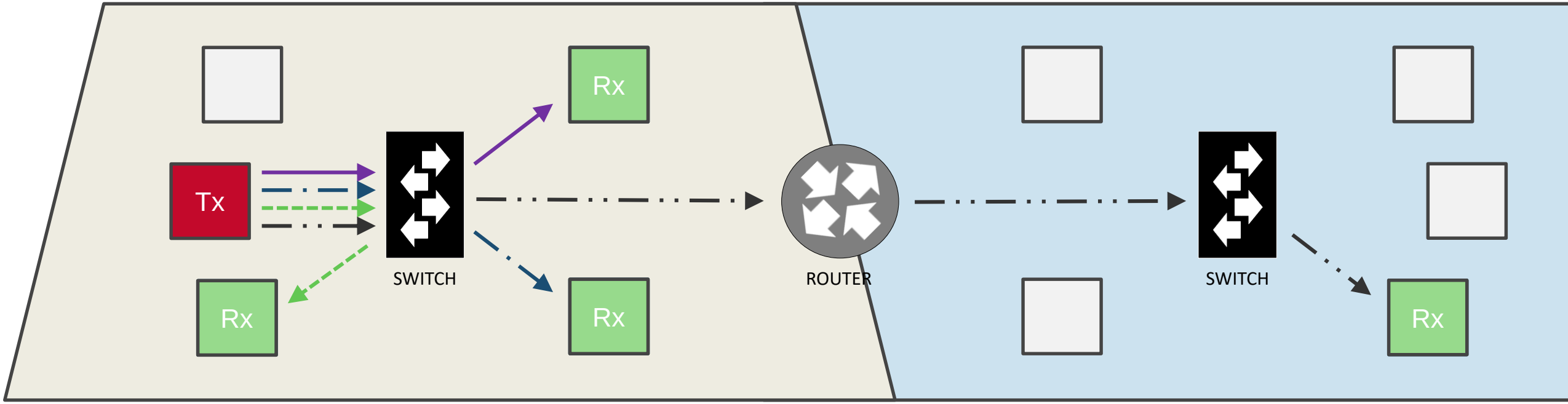


Create one VLAN as untagged, so a maintenance PC can be connected.

Types of Network Data: *Unicast, Broadcast, Multicast*

Unicast is like mail specifically sent to you

One-to-One Transmission, Can Be Routed



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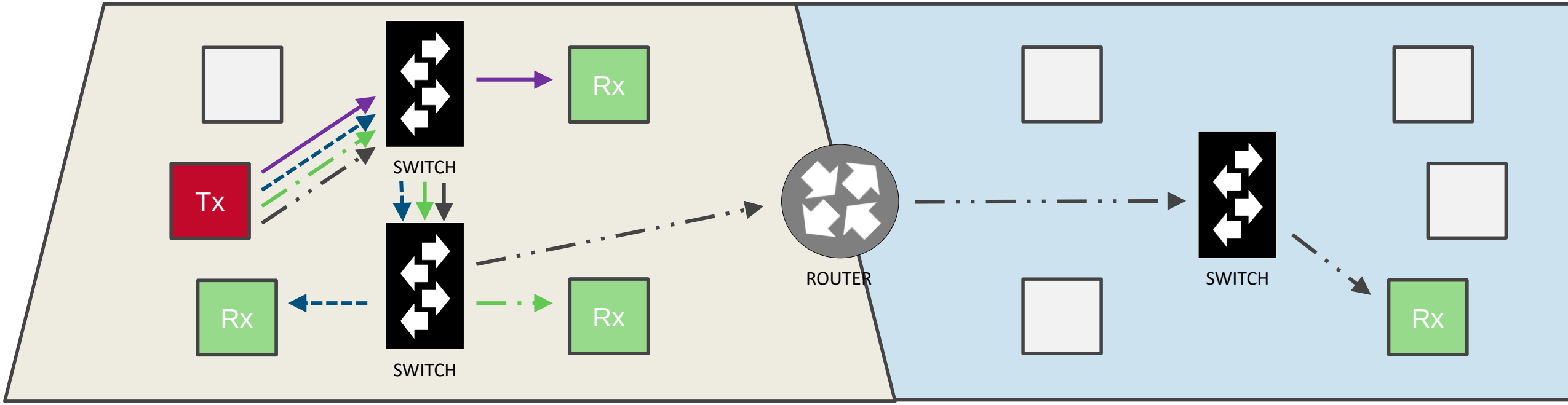
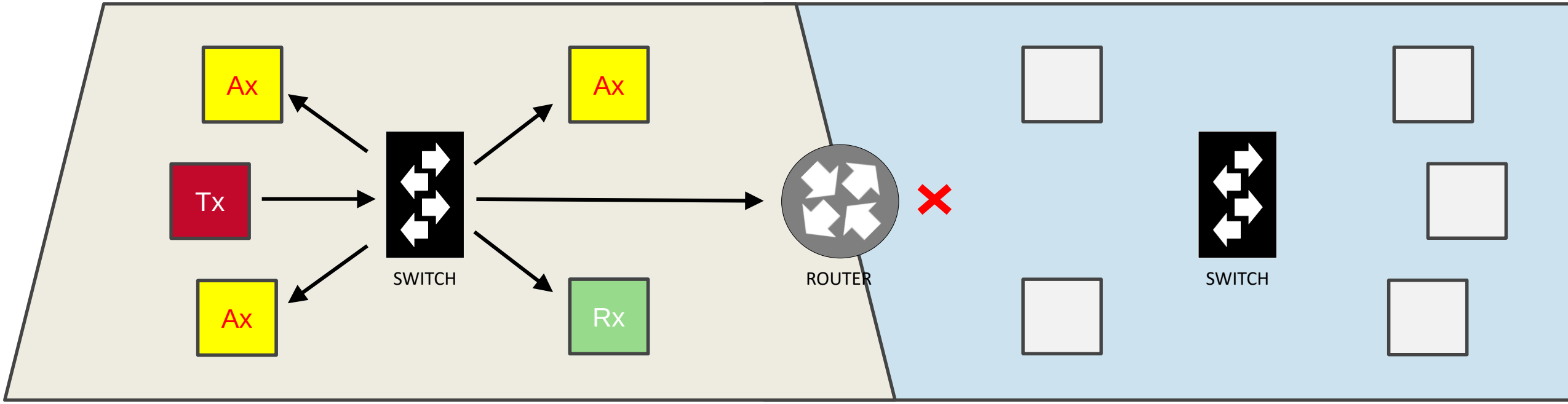


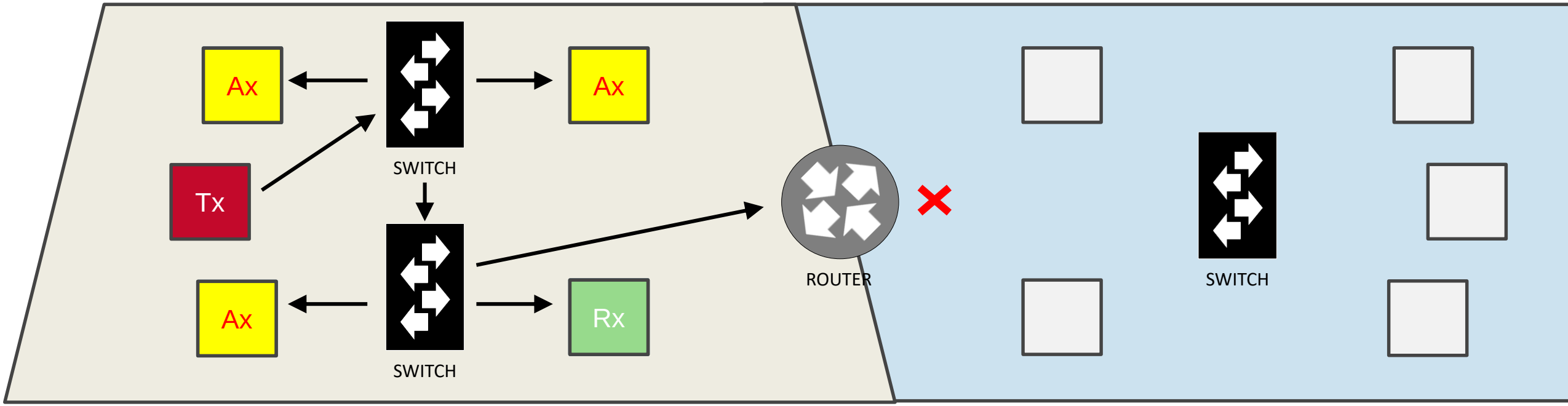
Broadcast is like Junk Mail by Zip Code

One-to-All Transmission, Does Not Cross a Router



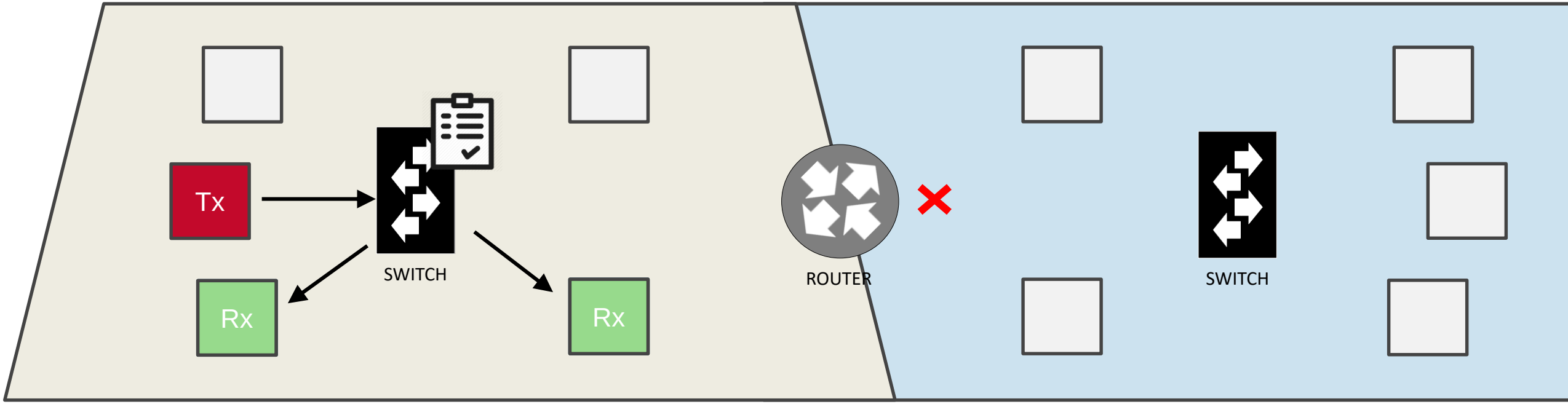
Broadcast is like Junk Mail by Zip Code

One-to-All Transmission, Does Not Cross a Router



Multicast w/ IGMP is like a Magazine Subscription

One-to-Many Transmission, Does Not Cross Router (By Default)



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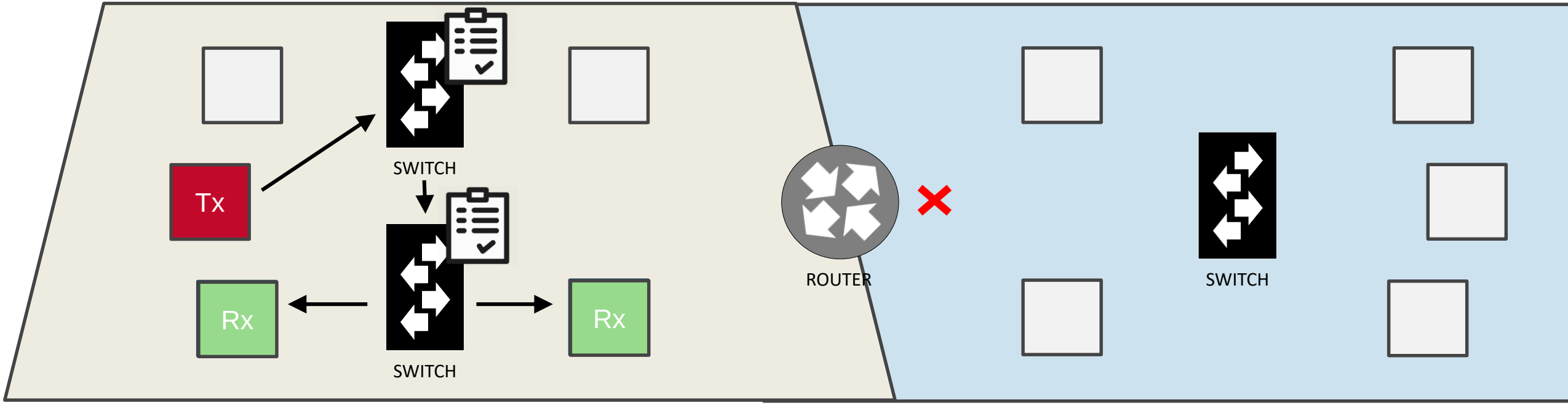
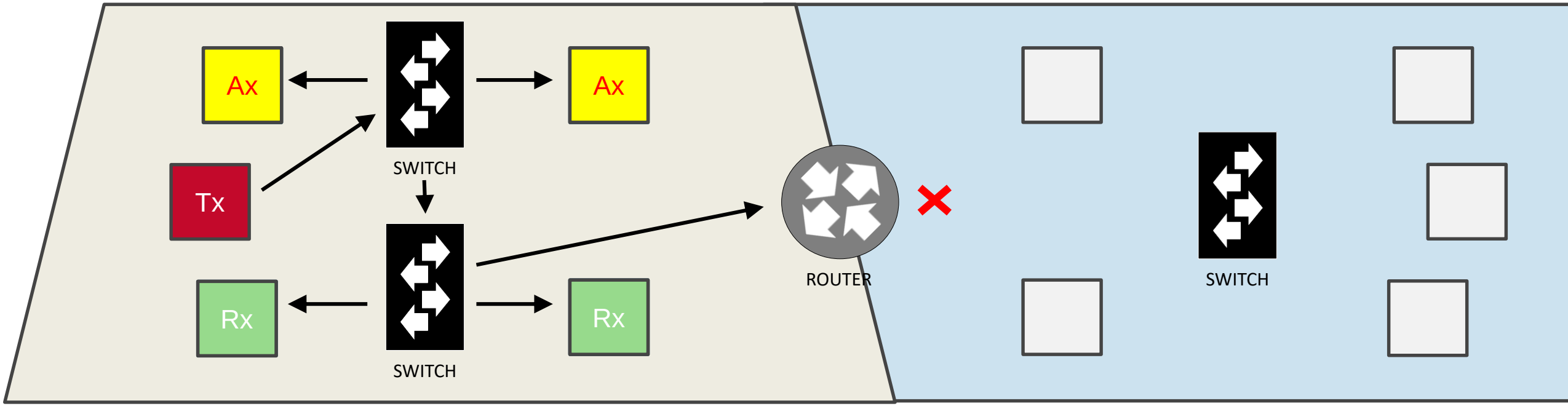
One-to-Many Transmission, Does Not Cross Router (By Default)



Multicast w/o IGMP acts like Broadcast

One-to-Many Transmission, Does Not Cross Router (By Default)



Segmenting the Broadcast Domain

LAYERED MODELS

OSI Model
(Lowest Three Layers)

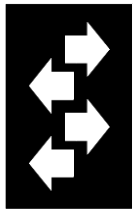
3: Network

2: Datalink

ROUTER

Layer 3 = Router
Passing data from one LAN to another

Unicast only
No Multicast passes (there are workarounds)
No Broadcast passes



SWITCH

Layer 2 = Switch
Passing data within a LAN

Unicast, Multicast, Broadcast allowed

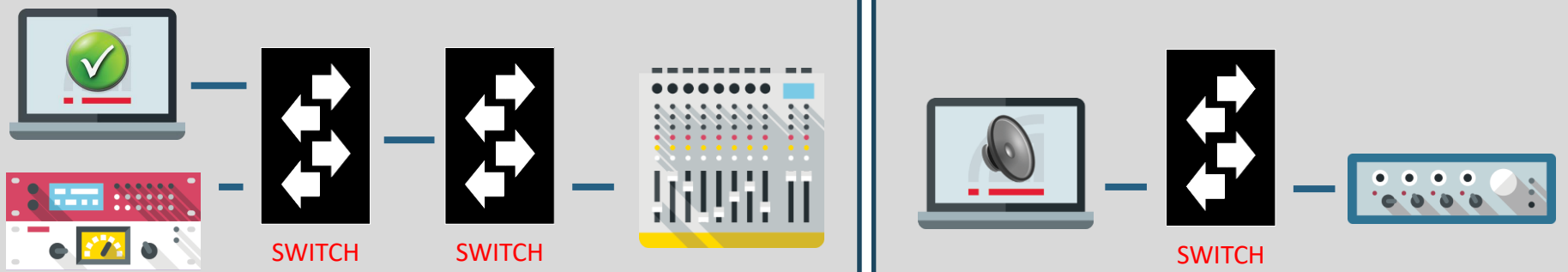
Quick Review:

OSI Model
(Lowest Three Layers)

3: Network

2: Datalink

VLANs segment broadcast domains (Layer 2).



A Meeting Space w/ Airwalls is analogous to VLANs in a Network…

Quick Review:

OSI Model
(Lowest Three Layers)

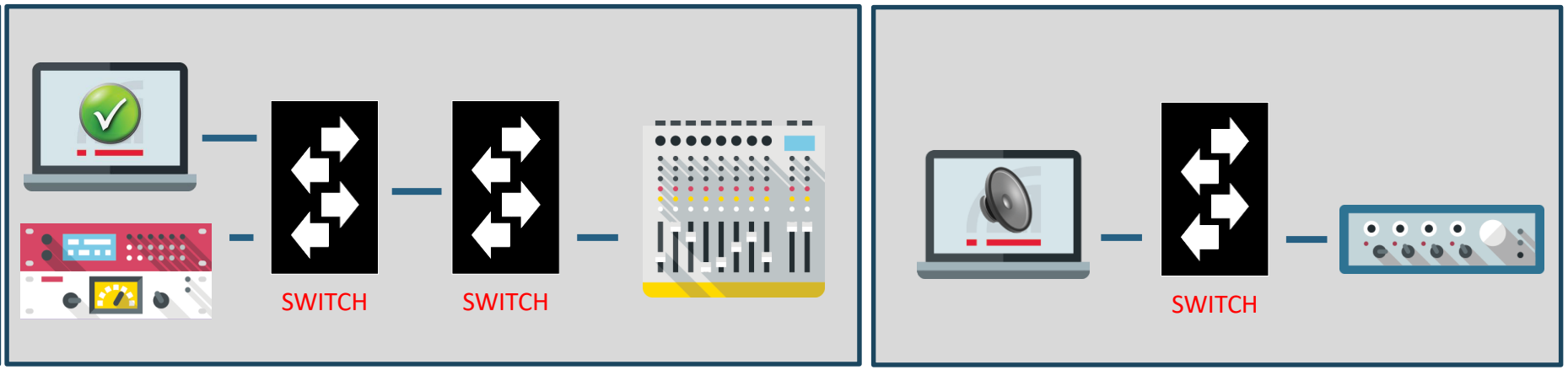
3: Network

2: Datalink

Separate IP ranges are designated to each VLAN.

192.168.1.0 /24

192.168.2.0 /24



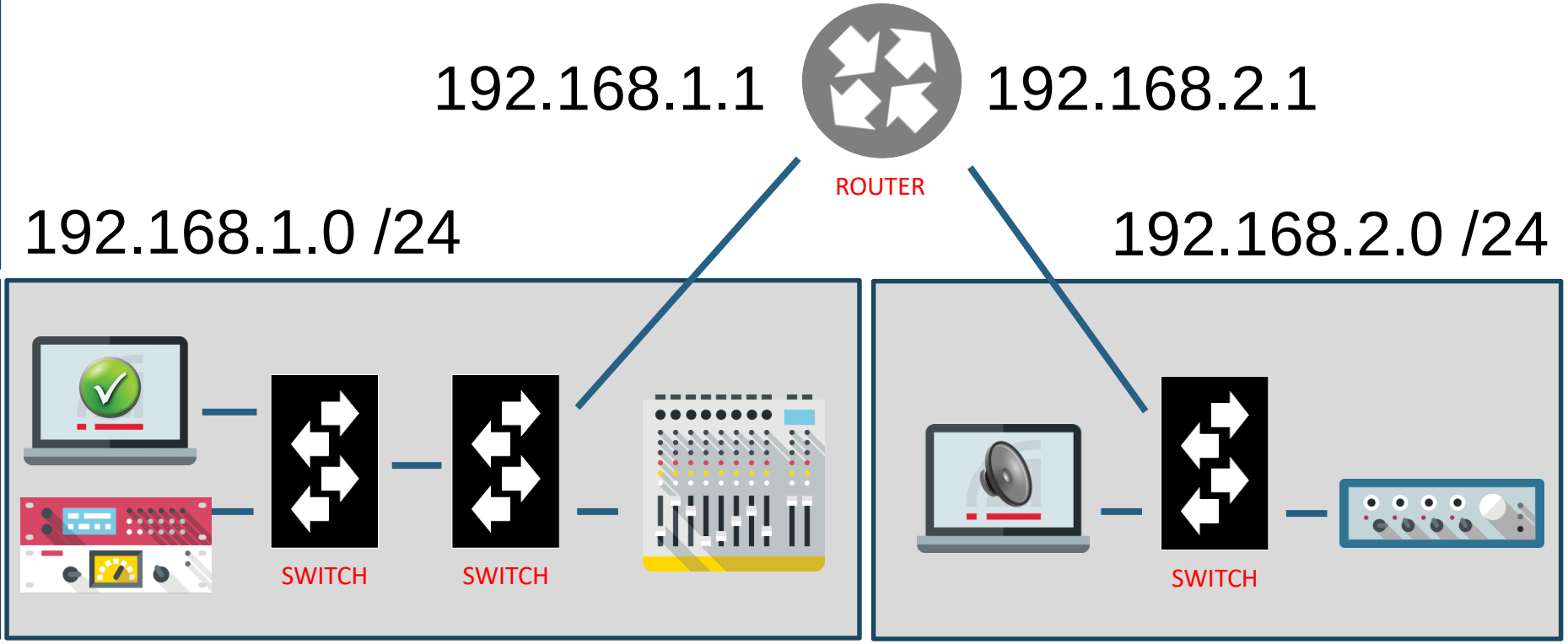
Quick Review:

OSI Model
(Lowest Three Layers)

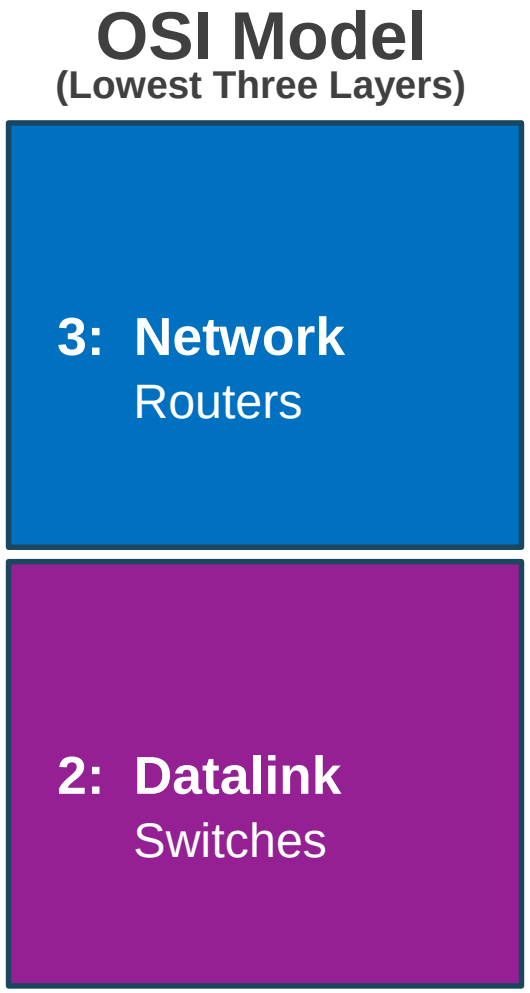
3: Network
Routers

2: Datalink
Switches

A router can then link devices between broadcast domains (VLANs).



What is a Layer 3 Switch?



If switching traffic occurs at Layer 2,
the what exactly is a “Layer 3 Switch”?

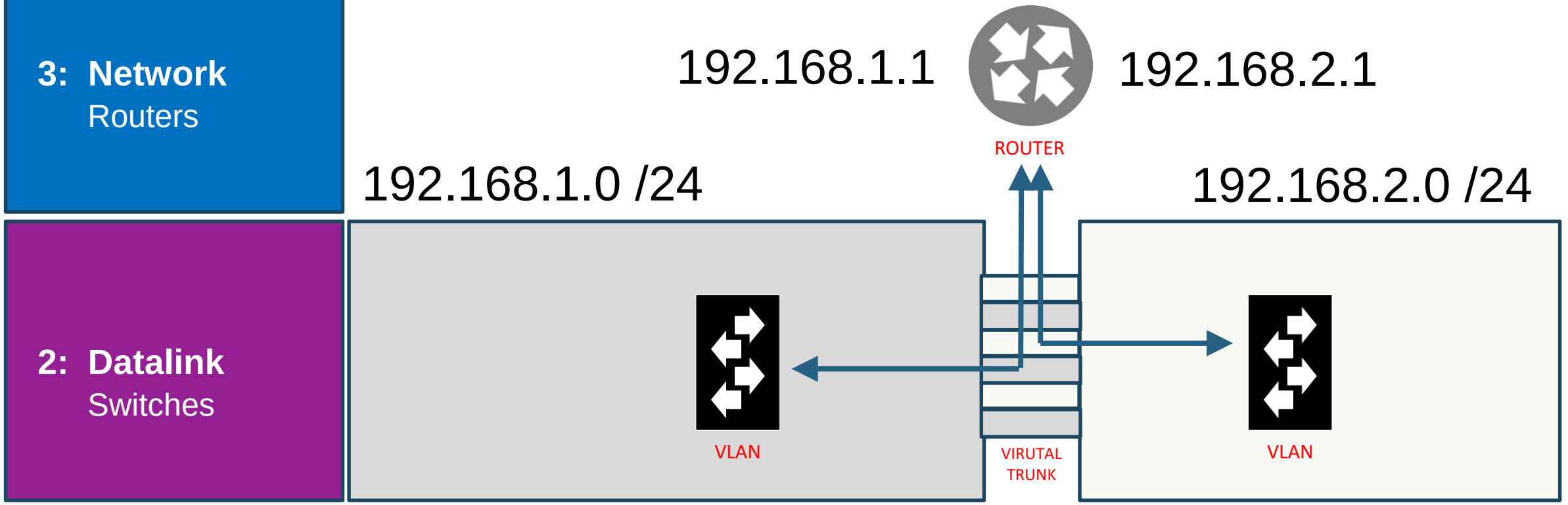
What is a Layer 3 Switch?

OSI Model
(Lowest Three Layers)

3: Network
Routers

2: Datalink
Switches

A “Layer 3 Switch” has routers inside.



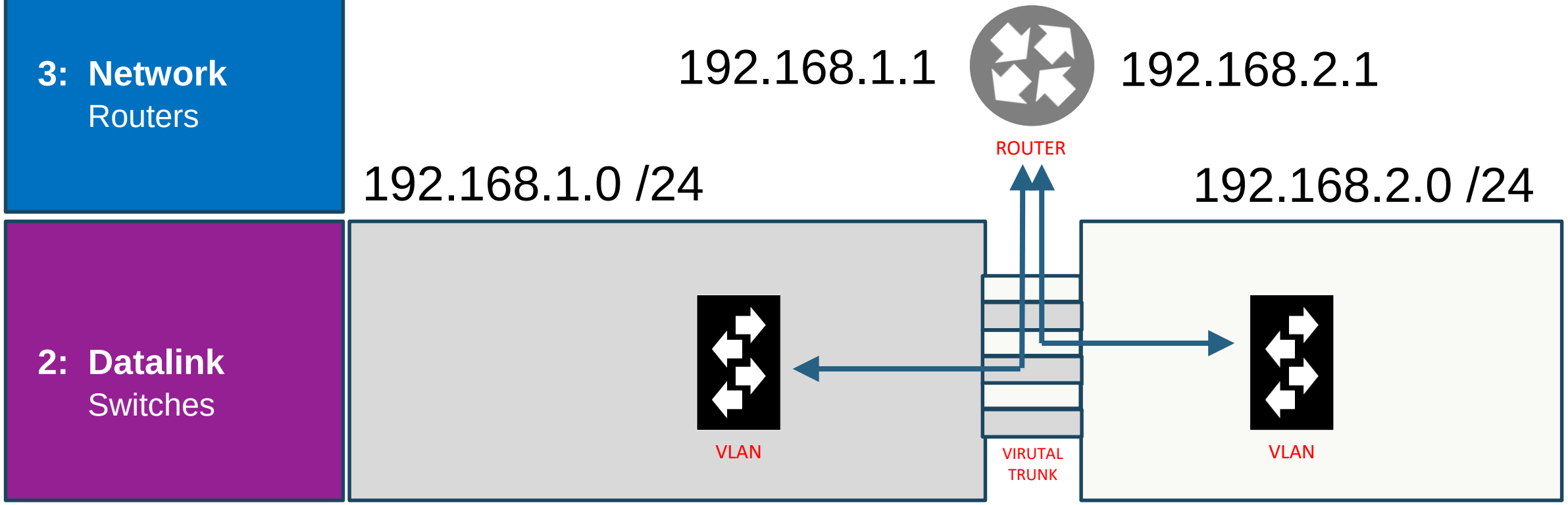
What is a Layer 3 Switch?

OSI Model
(Lowest Three Layers)

3: Network
Routers

2: Datalink
Switches

This is often referred to as a “Router on a Stick”.

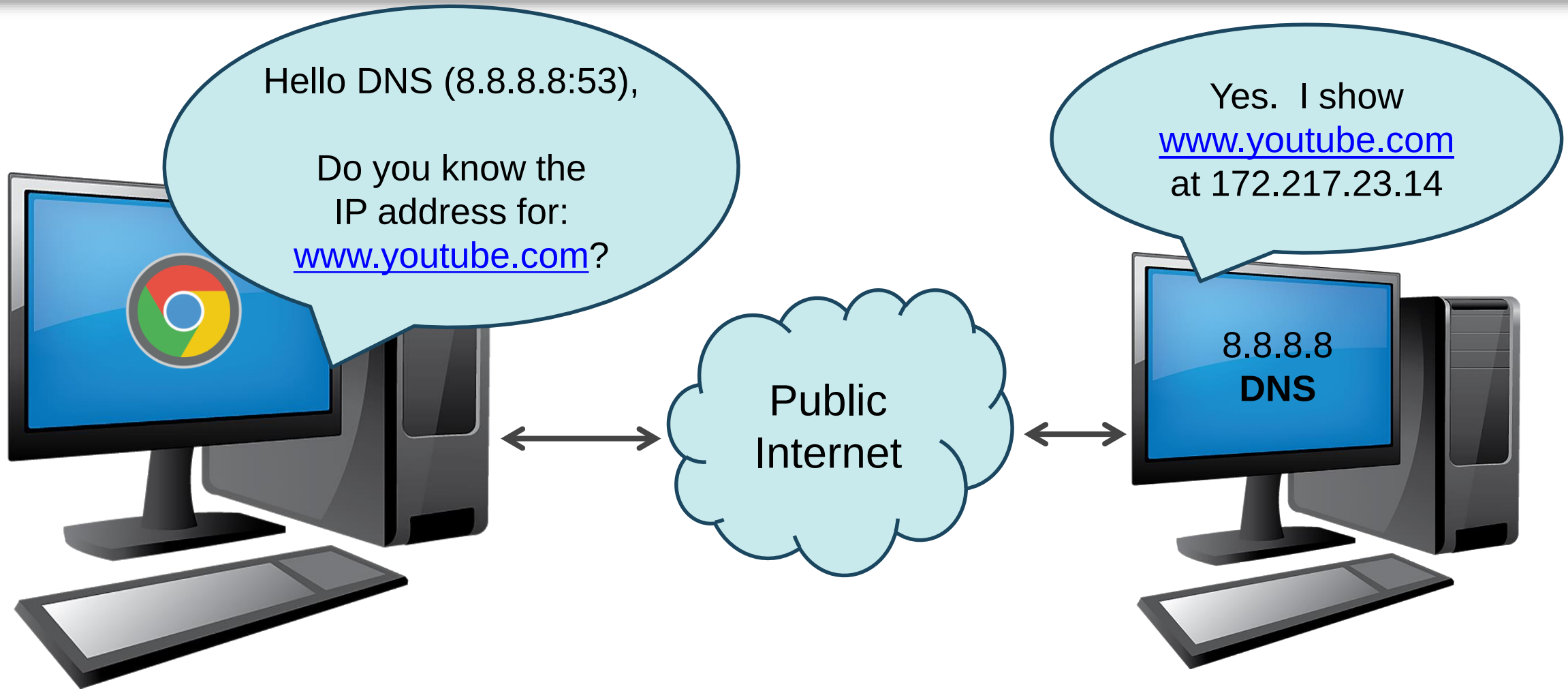


Network Ports: *UDP vs TCP*

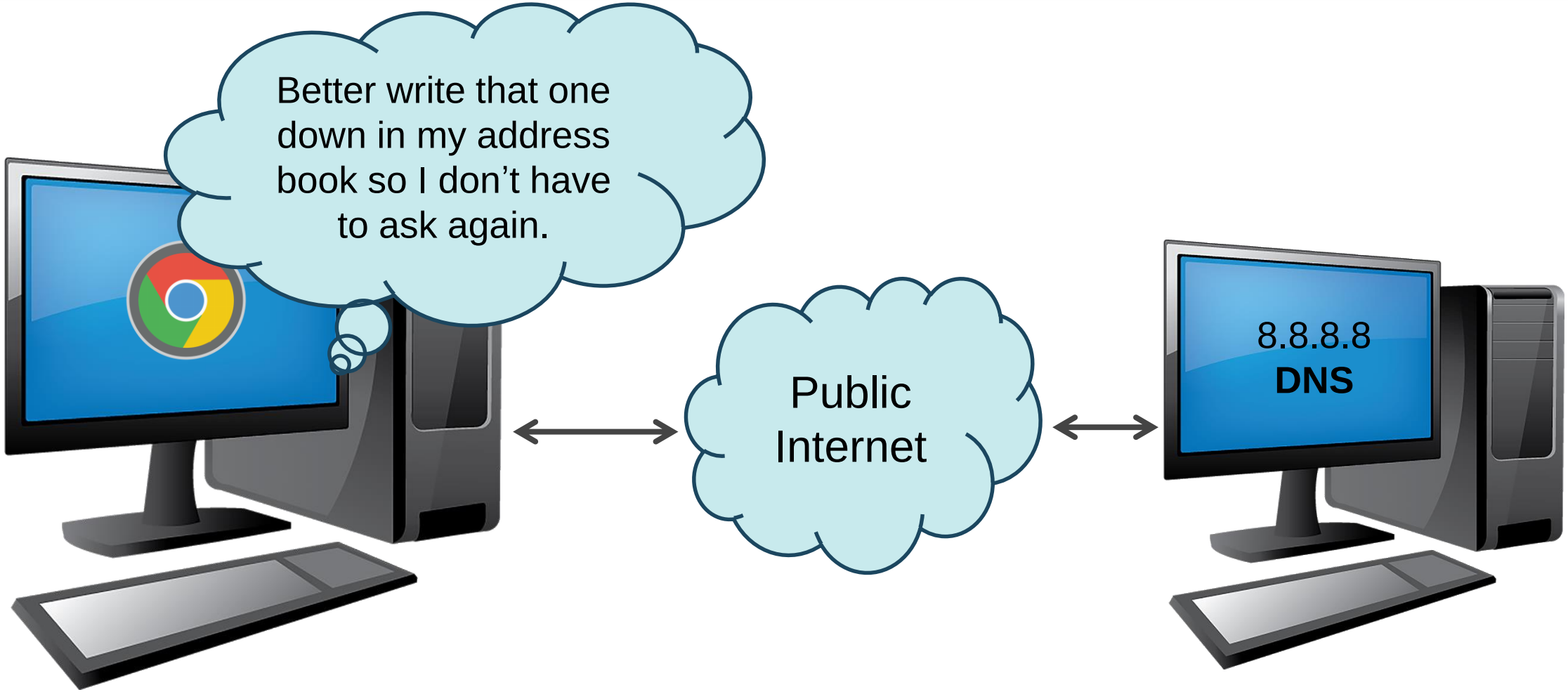
HOW DO WE MANAGE SO MANY CONNECTIONS AT ONCE?

APPLICATION ADDRESSES

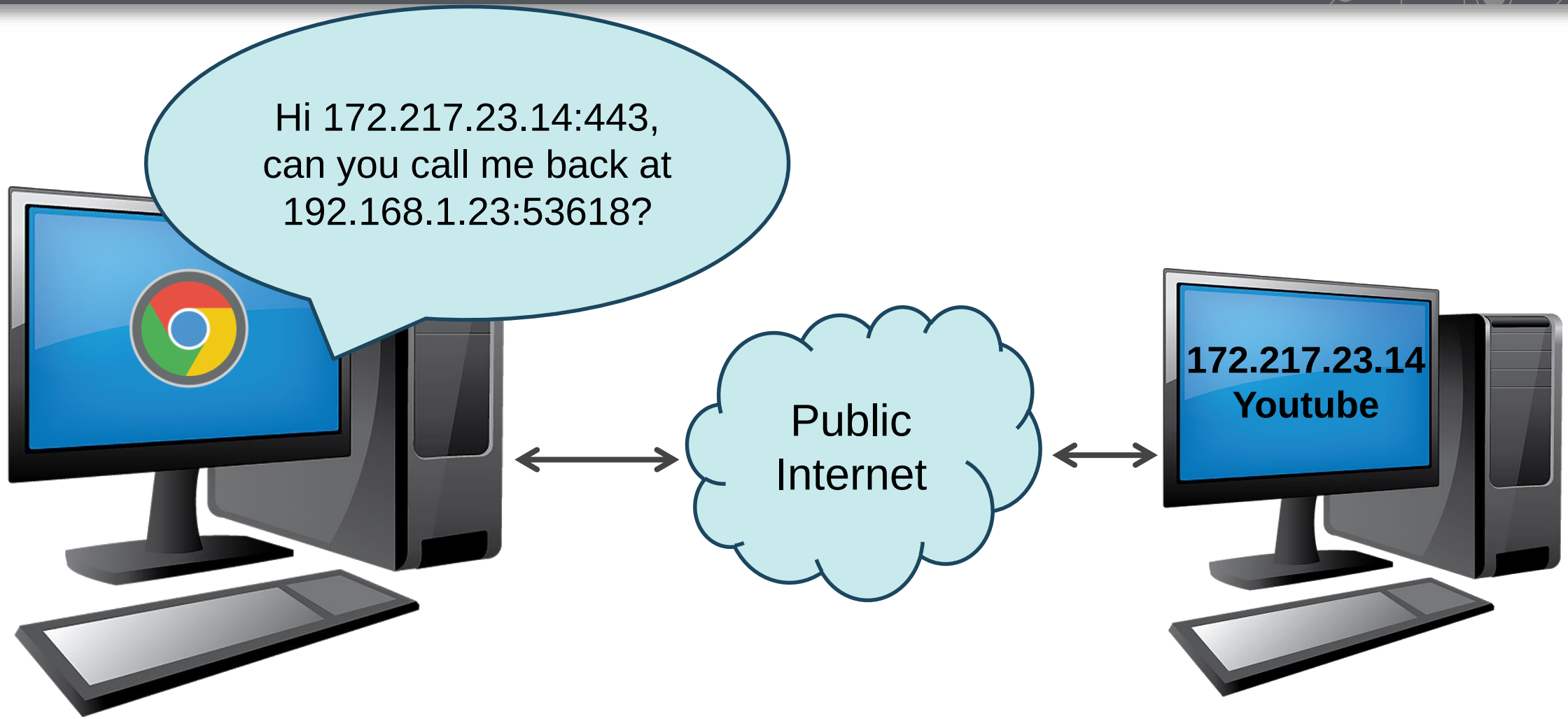
APPLICATION ADDRESSES



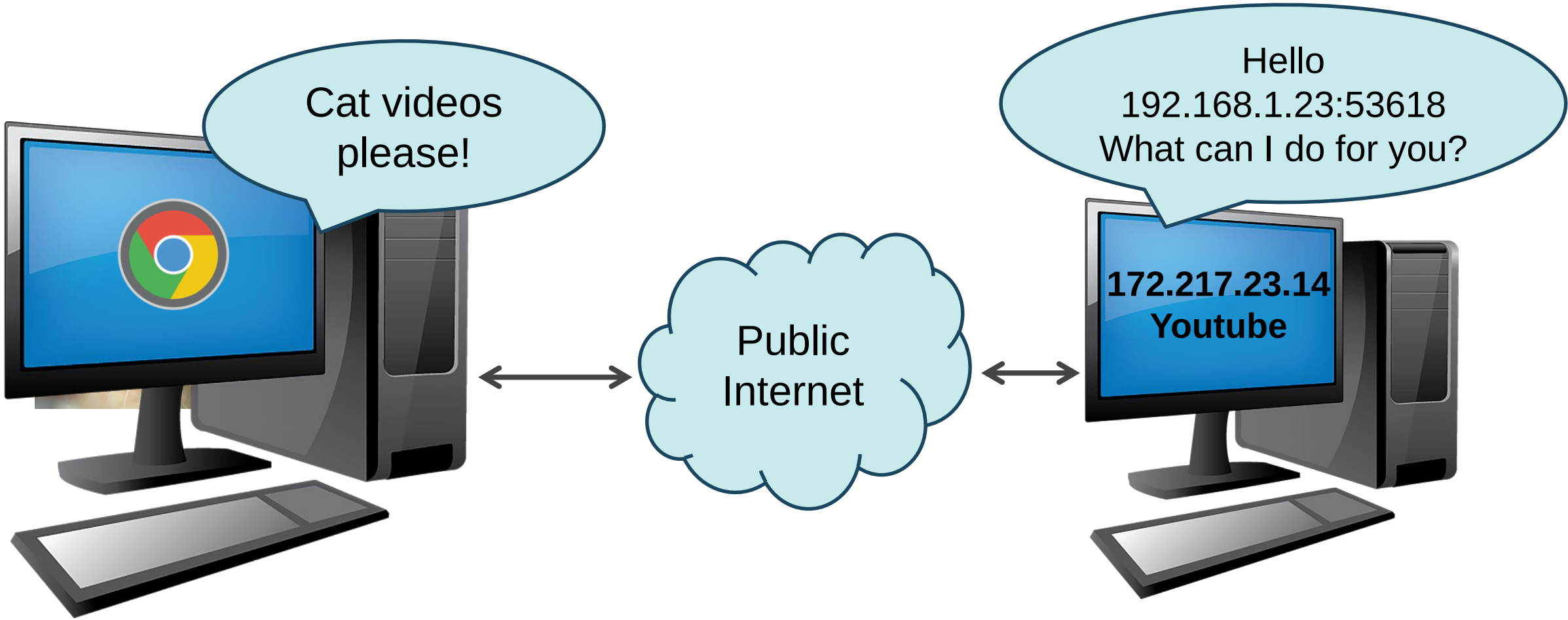
APPLICATION ADDRESSES



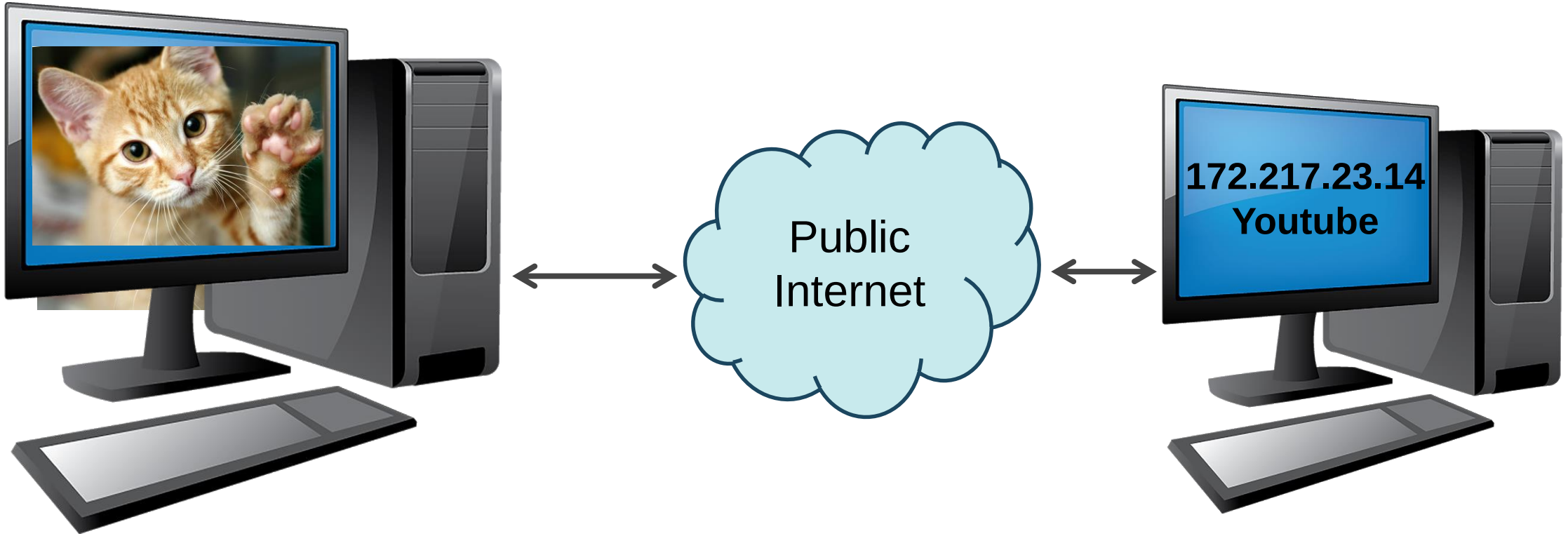
APPLICATION ADDRESSES



APPLICATION ADDRESSES



APPLICATION ADDRESSES



APPLICATION ADDRESSES

- The same process repeats for every application
- Each application has its own unique Internal (port) address

Application	Local Port	Remote IP	Remote Port
Youtube	TCP 53618	172.217.23.14	TCP 443
Facebook	TCP 53653	31.13.92.36	TCP 443
Outlook	TCP 64123	105.40.225.204	TCP 389
Spotify	TCP 57453	194.132.198.198	TCP 443

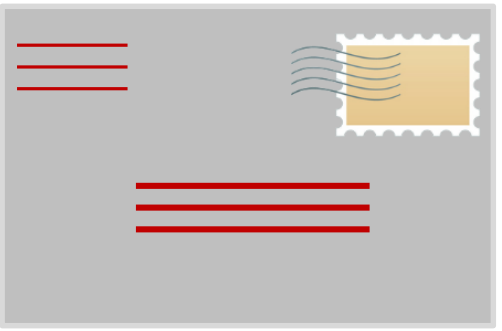
APPLICATION ADDRESSES

- The same process repeats for every application
- Each application has its own unique Internal (port) address
- Dante networks do this as well.

Application	Local Port	Remote IP	Remote Port
PTP	UDP 53618	224.0.1.129	UDP 319
Audio Flow	UDP 14340	192.168.1.56	UDP 14390
Audio Flow	UDP 14350	192.168.1.60	UDP 14367
Gain control	UDP 50135	192.168.1.56	UDP 50231

TCP vs UDP Traffic

- TCP traffic is like “Signature Required” mail
  The sender gets notification that the message was received.
- UDP traffic is like “First Class” mail
  Place envelope in mailbox and trust it gets delivered.

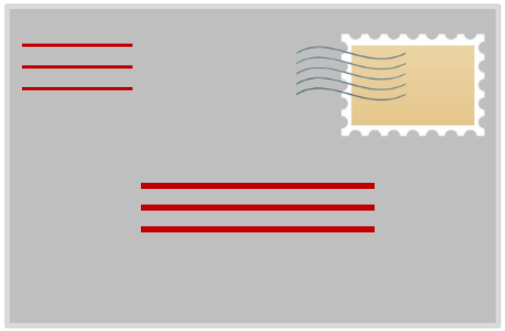


Does that mean UDP is less reliable?

No, it is a different tool for a different job.

TCP vs UDP Traffic

- TCP traffic is like “Signature Required” mail
  The sender gets notification that the message was received.



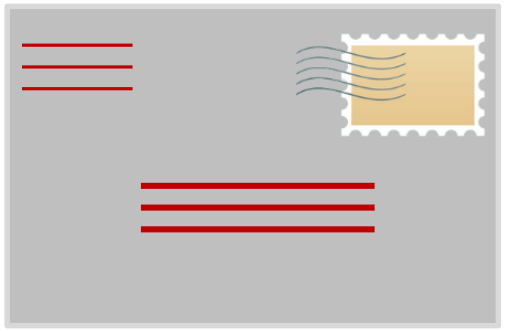
- TCP is appropriate for internet traffic where:
  - Communications are likely to be interrupted (internet),
  - Missing a packet invalidates data (ftp download) or
  - Timely delivery is a convenience, not a necessity.

- Problems with TCP for media:
  - If the packet was dropped, what is the time out on waiting for a confirmation?
  - Creates additional overhead, increasing likelihood of a problem.

TCP vs UDP Traffic

- UDP traffic is like “First Class” mail

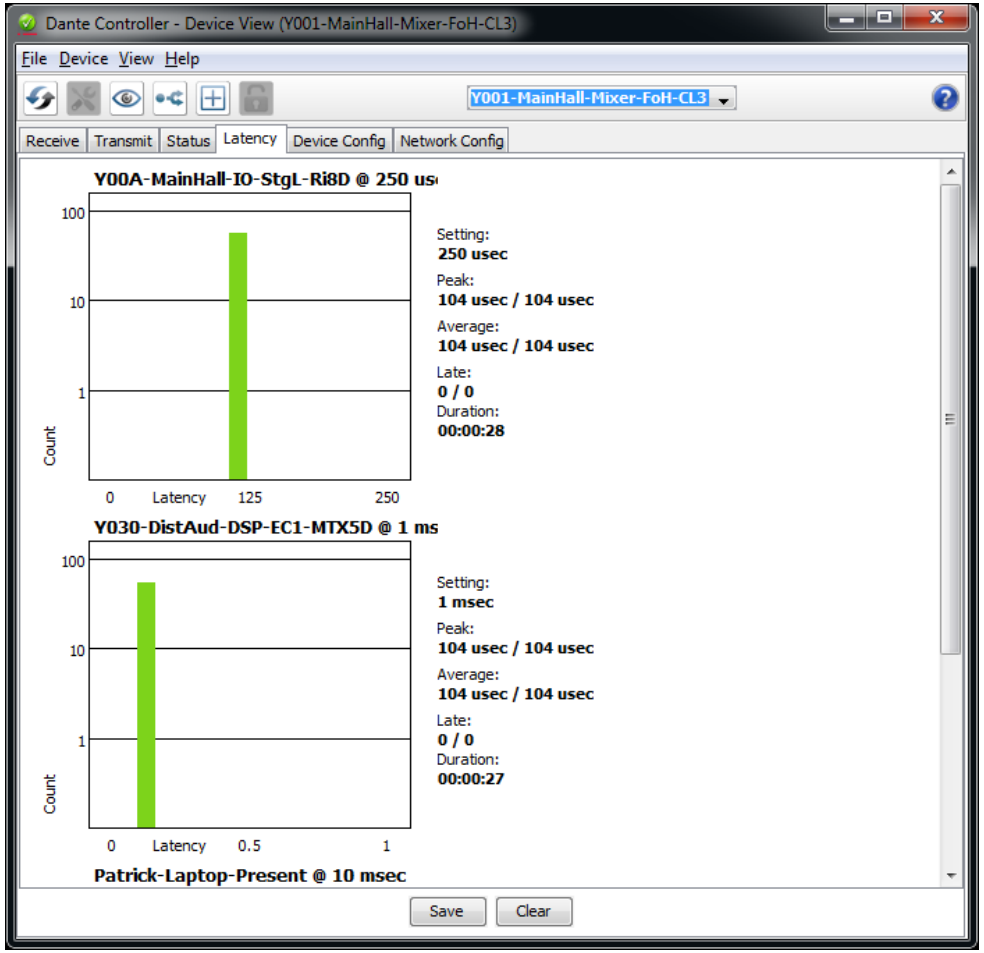
  Place envelope in mailbox and trust it gets delivered.



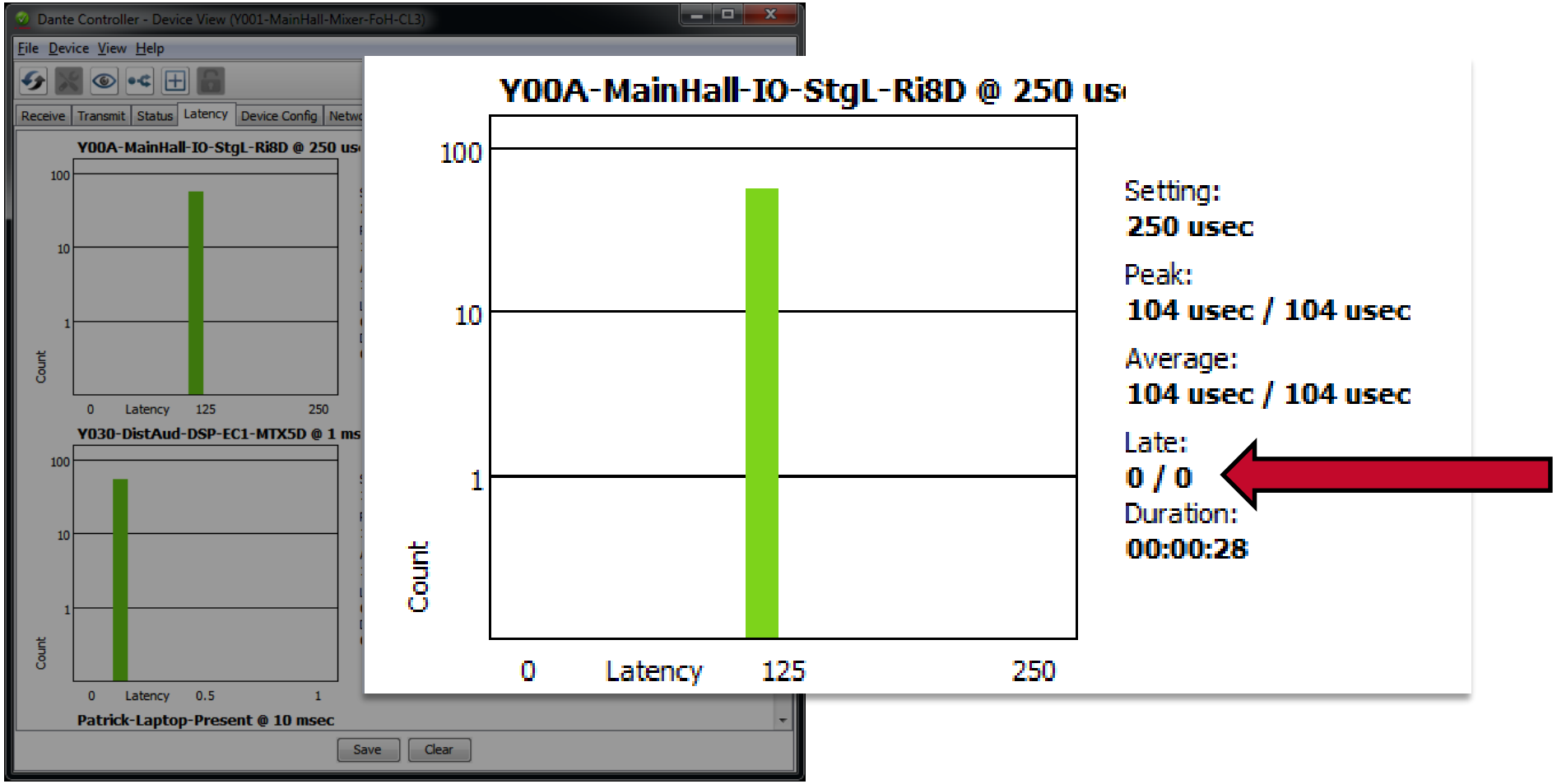
- UDP is appropriate for internet traffic where:
  - Communications are not likely to be interrupted (LAN),
  - Missing a packet in sequences can be overcome (error correction) or
  - Timely delivery or low overhead is key

- Devices can track network performance:
  - Managed switches and endpoints can log unhandled or missing packets

Verifying UDP Delivery



Verifying UDP Delivery



Dante Domain Manager a Brief Overview

Dante Domain Manager

Organize your devices into domains.

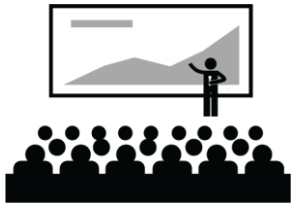
Route across Layer 3 networks seamlessly.

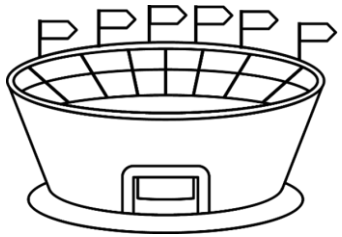
Authorize users to access the Dante network.

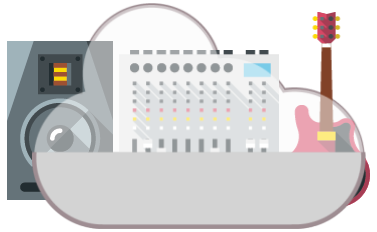
Monitor the health of the network proactively.

Log usage and status to troubleshoot objectively.

Dante Domains Organize your Network Devices

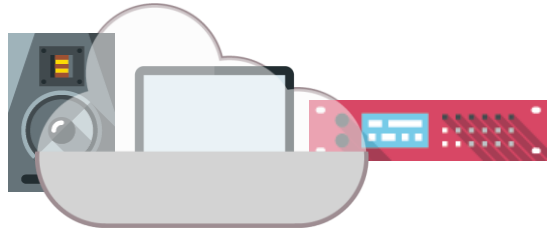




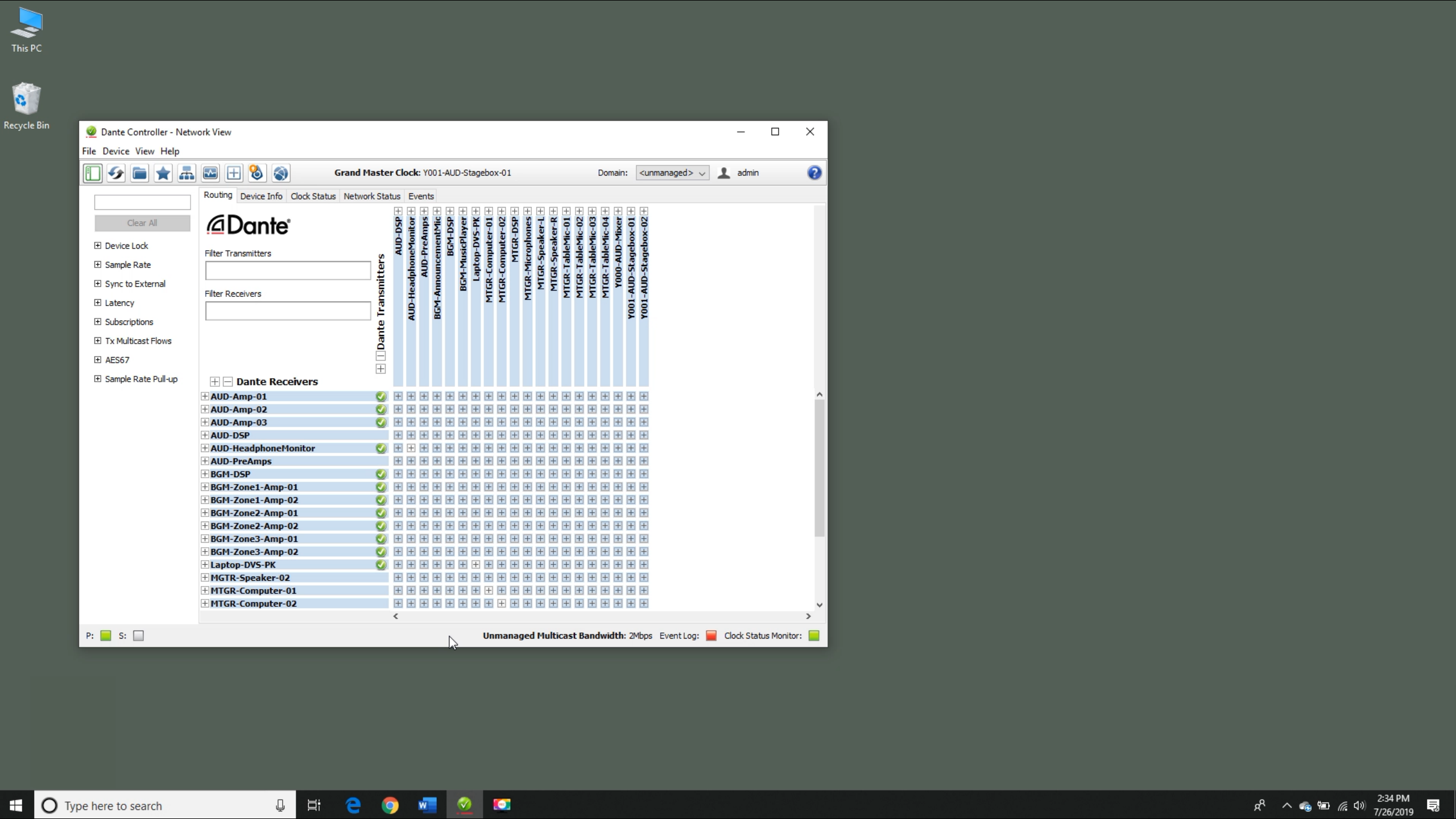


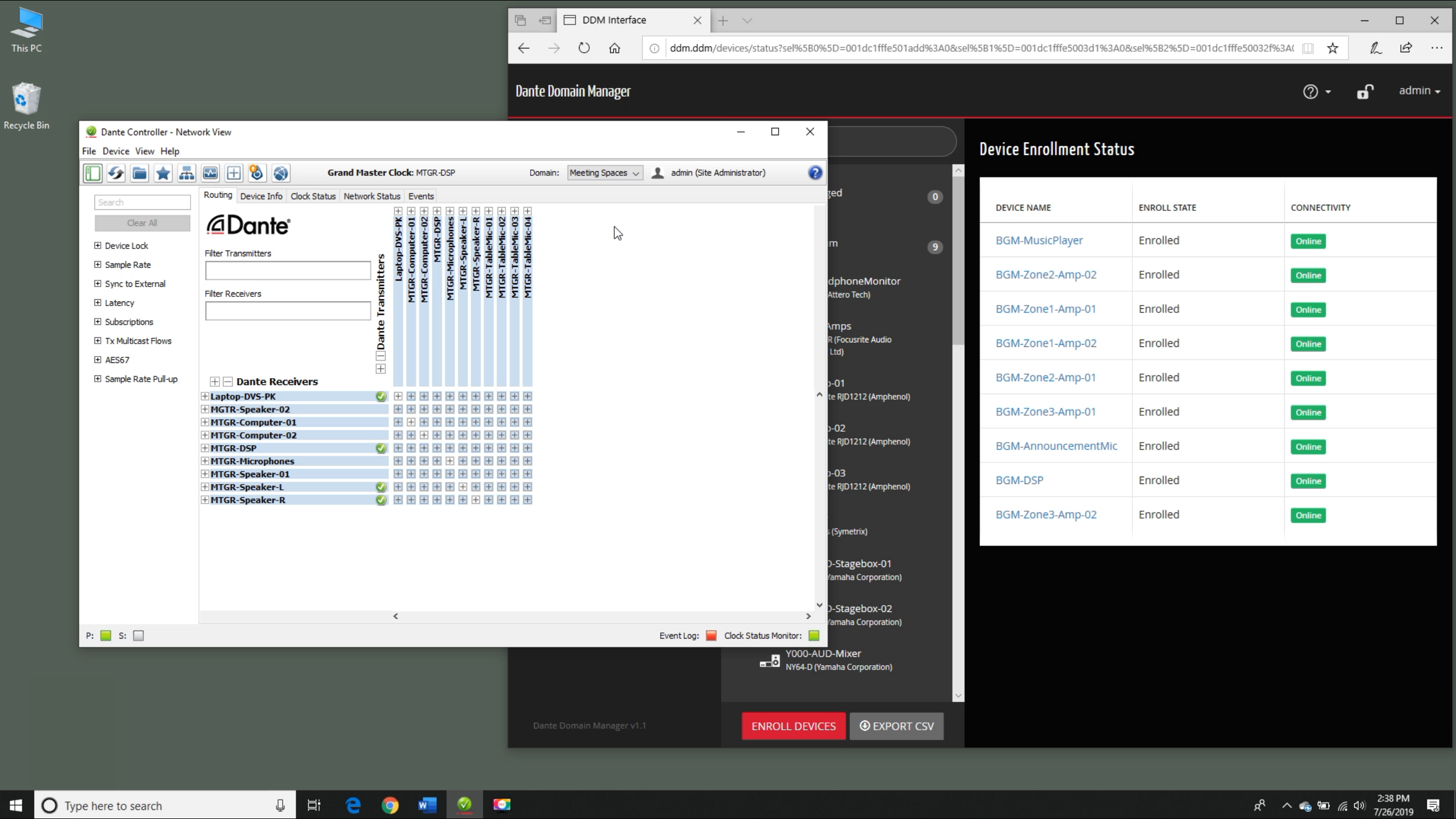
Auditorium

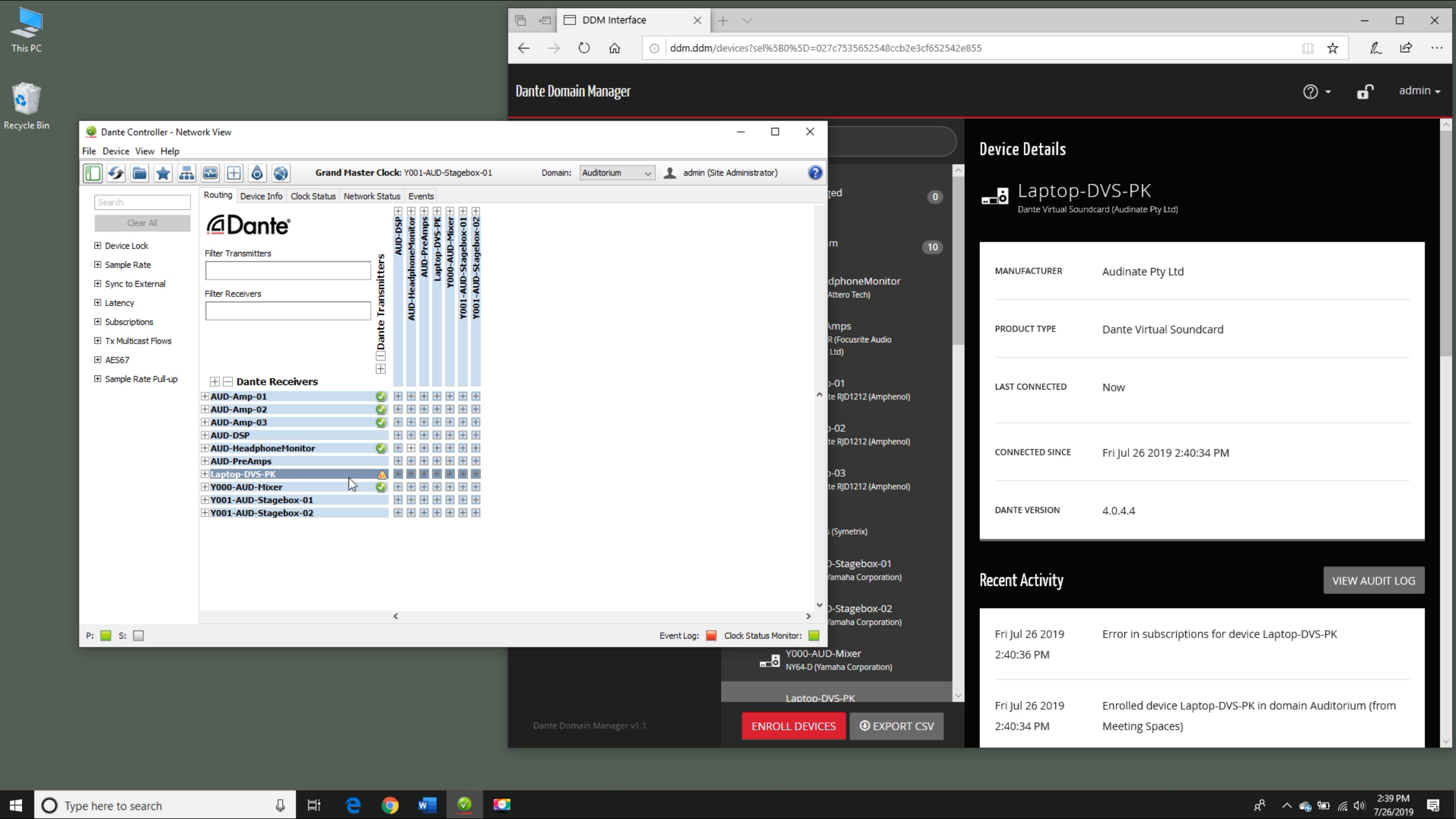
Distributed Audio

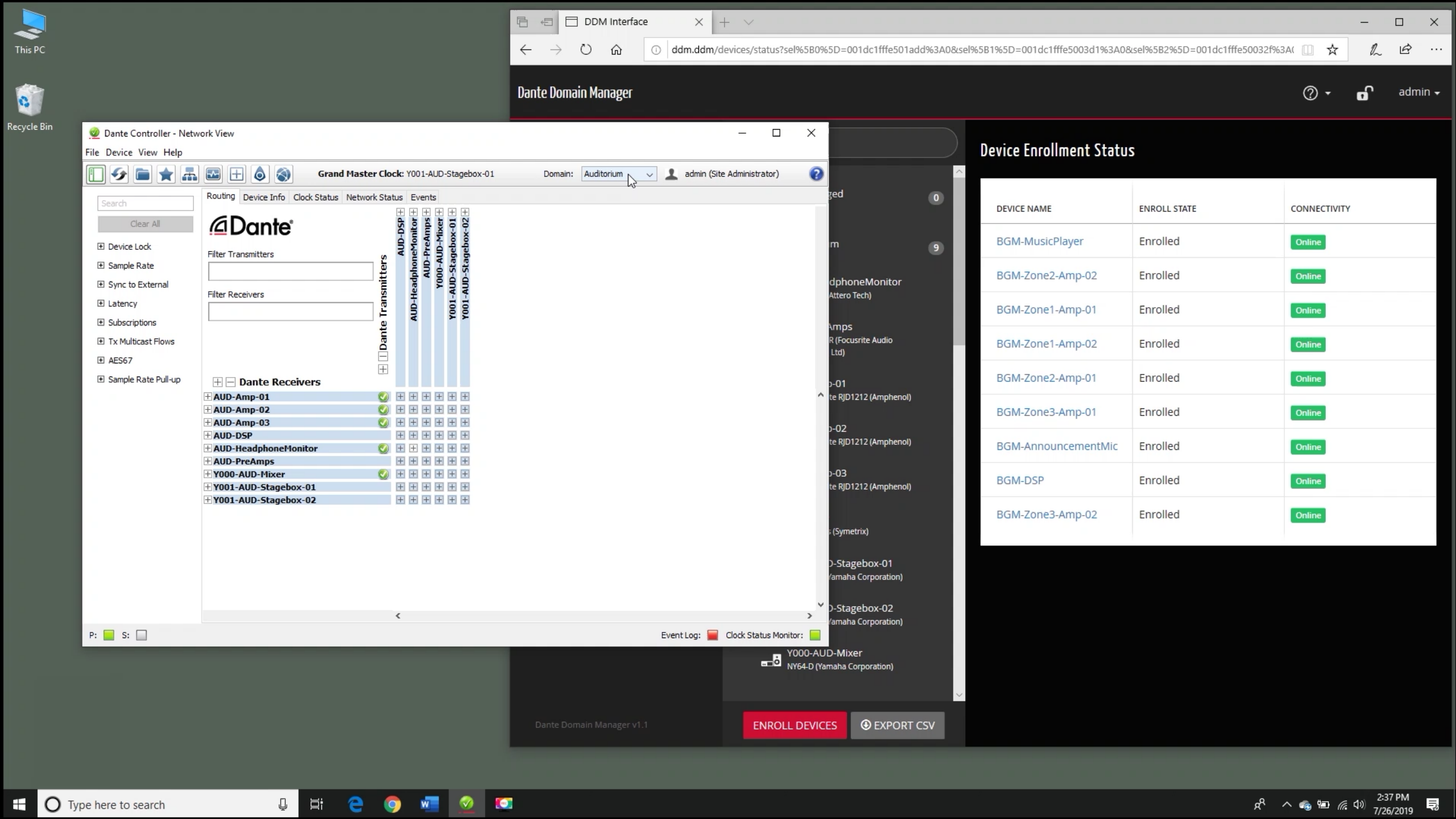


Meeting Spaces


This PC
Recycle Bin
Dante Controller - Network View
File Device View Help
Grand Master Clock: Y001-AUD-Stagebox-01
Domain: <unmanaged>
admin
Routing
Device Info
Clock Status
Network Status
Events
Clear All
Device Lock
Sample Rate
Sync to External
Latency
Subscriptions
Tx Multicast Flows
AES67
Sample Rate Pull-up
Filter Transmitters
Filter Receivers
Dante Transmitters
AUD-DSP
AUD-HeadphoneMonitor
AUD-PreAmps
BGM-AnnouncementMic
BGM-DSP
BGM-MusicPlayer
Laptop-DVS-PK
MTGR-Computer-01
MTGR-Computer-02
MTGR-DSP
MTGR-Microphones
MTGR-Speaker-L
MTGR-Speaker-R
MTGR-TableMic-01
MTGR-TableMic-02
MTGR-TableMic-03
MTGR-TableMic-04
Y000-AUD-Mixer
Y001-AUD-Stagebox-01
Y001-AUD-Stagebox-02
Dante Receivers
AUD-Amp-01
AUD-Amp-02
AUD-Amp-03
AUD-DSP
AUD-HeadphoneMonitor
AUD-PreAmps
BGM-DSP
BGM-Zone1-Amp-01
BGM-Zone1-Amp-02
BGM-Zone2-Amp-01
BGM-Zone2-Amp-02
BGM-Zone3-Amp-01
BGM-Zone3-Amp-02
Laptop-DVS-PK
MGTR-Speaker-02
MTGR-Computer-01
MTGR-Computer-02
P:
S:
Unmanaged Multicast Bandwidth: 2Mbps
Event Log:
Clock Status Monitor:
Type here to search
2:34 PM
7/26/2019


This PC
Recycle Bin
DDM Interface
ddm.ddm/devices/status?sel%5B0%5D=001dc1fffe501add%3A0&sel%5B1%5D=001dc1fffe5003d1%3A0&sel%5B2%5D=001dc1fffe50032f%3A0
Dante Domain Manager
admin
Dante Controller - Network View
File Device View Help
Grand Master Clock: MTGR-DSP
Domain: Meeting Spaces
admin (Site Administrator)
Routing
Device Info
Clock Status
Network Status
Events
Search
Clear All
Device Lock
Sample Rate
Sync to External
Latency
Subscriptions
Tx Multicast Flows
AES67
Sample Rate Pull-up
Filter Transmitters
Filter Receivers
Dante Transmitters
Laptop-DVS-PK
MTGR-Computer-01
MTGR-Computer-02
MTGR-DSP
MTGR-Microphones
MTGR-Speaker-L
MTGR-Speaker-R
MTGR-TableMic-01
MTGR-TableMic-02
MTGR-TableMic-03
MTGR-TableMic-04
Dante Receivers
Laptop-DVS-PK
MGTR-Speaker-02
MTGR-Computer-01
MTGR-Computer-02
MTGR-DSP
MTGR-Microphones
MTGR-Speaker-01
MTGR-Speaker-L
MTGR-Speaker-R
P:
S:
Event Log:
Clock Status Monitor:
Y000-AUD-Mixer
NY64-D (Yamaha Corporation)
Dante Domain Manager v1.1
ENROLL DEVICES
EXPORT CSV
Device Enrollment Status
DEVICE NAME
ENROLL STATE
CONNECTIVITY
BGM-MusicPlayer Enrolled Online
BGM-Zone2-Amp-02 Enrolled Online
BGM-Zone1-Amp-01 Enrolled Online
BGM-Zone1-Amp-02 Enrolled Online
BGM-Zone2-Amp-01 Enrolled Online
BGM-Zone3-Amp-01 Enrolled Online
BGM-AnnouncementMic Enrolled Online
BGM-DSP Enrolled Online
BGM-Zone3-Amp-02 Enrolled Online
Type here to search
2:38 PM
7/26/2019


This PC
Recycle Bin
DDM Interface
ddm.ddm/devices?sel%5B0%5D=027c7535652548ccb2e3cf652542e855
Dante Domain Manager
admin
Dante Controller - Network View
File Device View Help
Grand Master Clock: Y001-AUD-Stagebox-01
Domain: Auditorium
admin (Site Administrator)
Routing
Device Info
Clock Status
Network Status
Events
Search
Clear All
Device Lock
Sample Rate
Sync to External
Latency
Subscriptions
Tx Multicast Flows
AES67
Sample Rate Pull-up
Filter Transmitters
Filter Receivers
Dante Transmitters
AUD-DSP
AUD-HeadphoneMonitor
AUD-PreAmps
Laptop-DVS-PK
Y000-AUD-Mixer
Y001-AUD-Stagebox-01
Y001-AUD-Stagebox-02
Dante Receivers
AUD-Amp-01
AUD-Amp-02
AUD-Amp-03
AUD-DSP
AUD-HeadphoneMonitor
AUD-PreAmps
Laptop-DVS-PK
Y000-AUD-Mixer
Y001-AUD-Stagebox-01
Y001-AUD-Stagebox-02
P:
S:
Event Log:
Clock Status Monitor:
Device Details
Laptop-DVS-PK
Dante Virtual Soundcard (Audinate Pty Ltd)
MANUFACTURER
Audinate Pty Ltd
PRODUCT TYPE
Dante Virtual Soundcard
LAST CONNECTED
Now
CONNECTED SINCE
Fri Jul 26 2019 2:40:34 PM
DANTE VERSION
4.0.4.4
Recent Activity
VIEW AUDIT LOG
Fri Jul 26 2019 2:40:36 PM
Error in subscriptions for device Laptop-DVS-PK
Fri Jul 26 2019 2:40:34 PM
Enrolled device Laptop-DVS-PK in domain Auditorium (from Meeting Spaces)
Y000-AUD-Mixer
NY64-D (Yamaha Corporation)
Laptop-DVS-PK
Dante Domain Manager v1.1
ENROLL DEVICES
EXPORT CSV
Type here to search
2:39 PM
7/26/2019


This PC
Recycle Bin
DDM Interface
ddm.ddm/devices/status?sel%5B0%5D=001dc1fffe501add%3A0&sel%5B1%5D=001dc1fffe5003d1%3A0&sel%5B2%5D=001dc1fffe50032f%3A(
Dante Domain Manager
admin
Dante Controller - Network View
File Device View Help
Grand Master Clock: Y001-AUD-Stagebox-01
Domain: Auditorium
admin (Site Administrator)
Routing
Device Info
Clock Status
Network Status
Events
Search
Clear All
Device Lock
Sample Rate
Sync to External
Latency
Subscriptions
Tx Multicast Flows
AES67
Sample Rate Pull-up
Filter Transmitters
Filter Receivers
Dante Transmitters
AUD-DSP
AUD-HeadphoneMonitor
AUD-PreAmps
Y000-AUD-Mixer
Y001-AUD-Stagebox-01
Y001-AUD-Stagebox-02
Dante Receivers
AUD-Amp-01
AUD-Amp-02
AUD-Amp-03
AUD-DSP
AUD-HeadphoneMonitor
AUD-PreAmps
Y000-AUD-Mixer
Y001-AUD-Stagebox-01
Y001-AUD-Stagebox-02
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S:
Event Log:
Clock Status Monitor:
Y000-AUD-Mixer
NY64-D (Yamaha Corporation)
Dante Domain Manager v1.1
ENROLL DEVICES
EXPORT CSV
Device Enrollment Status
DEVICE NAME
ENROLL STATE
CONNECTIVITY
BGM-MusicPlayer Enrolled Online
BGM-Zone2-Amp-02 Enrolled Online
BGM-Zone1-Amp-01 Enrolled Online
BGM-Zone1-Amp-02 Enrolled Online
BGM-Zone2-Amp-01 Enrolled Online
BGM-Zone3-Amp-01 Enrolled Online
BGM-AnnouncementMic Enrolled Online
BGM-DSP Enrolled Online
BGM-Zone3-Amp-02 Enrolled Online
Type here to search
2:37 PM
7/26/2019

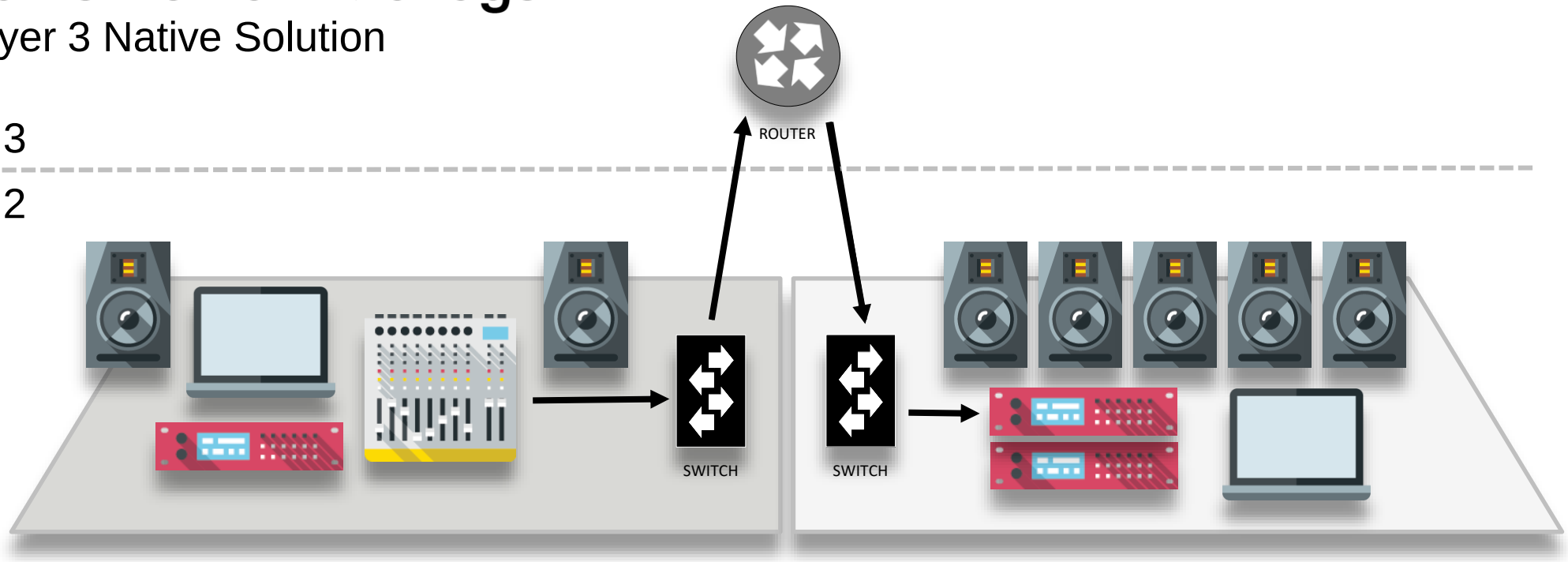
Routing Across Layer 3 Networks

Dante Domain Manager™

Layer 3 Native Solution

Layer 3

Layer 2



Dante Controller - Network View

File Device View Help

Grand Master Clock: MTGR-DSP Domain: Meeting Spaces admin (Site Administrator)

Search

Clear All

- Device Lock
- Sample Rate
- Sync to External
- Latency
- Subscriptions
- Tx Multicast Flows
- AES67
- Sample Rate Pull-up

Routing | Device Info | Clock Status | Network Status | Events

Device Name	Model Name	Product Version	Dante Version	Device Lock	Primary Address	Primary Link Speed	Secondary Address	Se Li
192.168.0.0/24								
Laptop-DVS-PK	Dante Virtual Soundcard	4.0.4.4	4.0.4.4	N/A	192.168.0.183	1Gbps	N/A	N/
MGTR-Speaker-02	AVIO-DAO1	1.1.0	4.1.5.2	N/A	192.168.0.110	100Mbps	N/A	N/
MTGR-Computer-01	AVIO-USB	1.1.0	4.1.5.3	N/A	192.168.0.193	100Mbps	N/A	N/
MTGR-Computer-02	AVIO-USB	1.1.0	4.1.5.3	N/A	192.168.0.192	100Mbps	N/A	N/
MTGR-DSP	Prism	1.0.2	4.0.7.8	N/A	192.168.0.147	1Gbps	N/A	N/
MTGR-Microphones	Model 5414 Mic/Line IO Interface	2.7.0	4.0.11.3	N/A	192.168.0.106	100Mbps	N/A	N/
MTGR-Speaker-01	AVIO-DAO1	1.1.0	4.1.5.2	N/A	192.168.0.166	100Mbps	N/A	N/
MTGR-Speaker-L	StudioLive AI Loudspeaker	0.0.1	4.0.8.10	N/A	192.168.0.175	100Mbps	N/A	N/
MTGR-Speaker-R	StudioLive AI Loudspeaker	0.0.1	4.0.8.10	N/A	192.168.0.176	100Mbps	N/A	N/
MTGR-TableMic-01	ATND971	1.0.0	4.0.10.2	N/A	192.168.0.118	100Mbps	N/A	N/
MTGR-TableMic-02	ATND971	1.0.0	4.0.10.2	N/A	192.168.0.142	100Mbps	N/A	N/
MTGR-TableMic-03	ATND971	1.0.0	4.0.10.2	N/A	192.168.0.129	100Mbps	N/A	N/
MTGR-TableMic-04	ATND971	1.0.0	4.0.10.2	N/A	192.168.0.131	100Mbps	N/A	N/

P: S: Event Log: Clock Status Monitor:

NO DEVICES SEL

ged 0

m 9

dphoneMonitor
Attero Tech)

Amps
R (Focusrite Audio
Ltd)

o-01
te RJD1212 (Amphenol)

o-02
te RJD1212 (Amphenol)

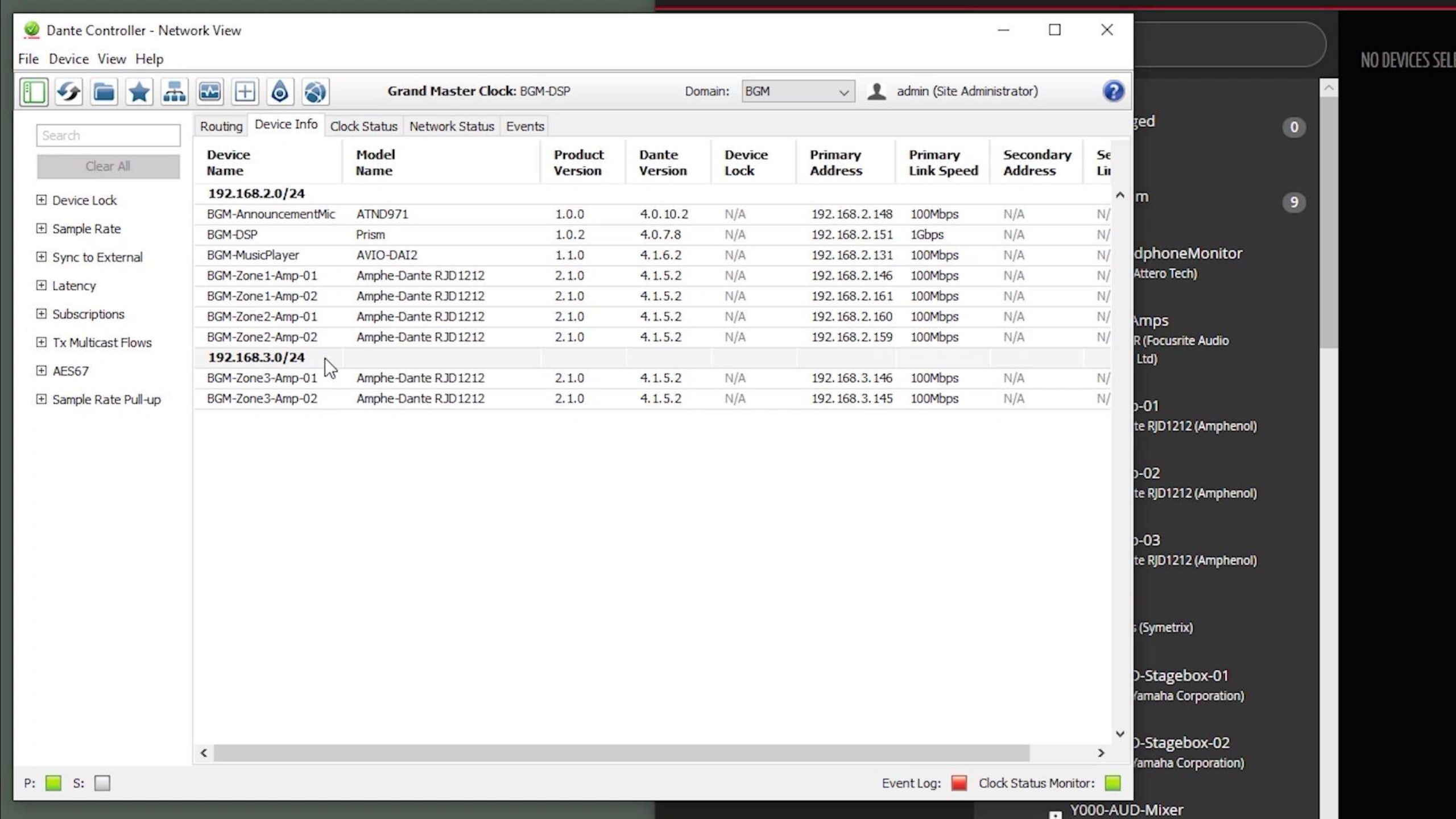
o-03
te RJD1212 (Amphenol)

(Symetrix)

O-Stagebox-01
Yamaha Corporation)

O-Stagebox-02
Yamaha Corporation)

Y000-AUD-Mixer


Dante Controller - Network View
File Device View Help
Grand Master Clock: BGM-DSP
Domain: BGM
admin (Site Administrator)
Search
Clear All
Device Lock
Sample Rate
Sync to External
Latency
Subscriptions
Tx Multicast Flows
AES67
Sample Rate Pull-up
Routing
Device Info
Clock Status
Network Status
Events
Device Name
Model Name
Product Version
Dante Version
Device Lock
Primary Address
Primary Link Speed
Secondary Address
192.168.2.0/24
BGM-AnnouncementMic ATND971 1.0.0 4.0.10.2 N/A 192.168.2.148 100Mbps N/A
BGM-DSP Prism 1.0.2 4.0.7.8 N/A 192.168.2.151 1Gbps N/A
BGM-MusicPlayer AVIO-DAI2 1.1.0 4.1.6.2 N/A 192.168.2.131 100Mbps N/A
BGM-Zone1-Amp-01 Amphe-Dante RJD1212 2.1.0 4.1.5.2 N/A 192.168.2.146 100Mbps N/A
BGM-Zone1-Amp-02 Amphe-Dante RJD1212 2.1.0 4.1.5.2 N/A 192.168.2.161 100Mbps N/A
BGM-Zone2-Amp-01 Amphe-Dante RJD1212 2.1.0 4.1.5.2 N/A 192.168.2.160 100Mbps N/A
BGM-Zone2-Amp-02 Amphe-Dante RJD1212 2.1.0 4.1.5.2 N/A 192.168.2.159 100Mbps N/A
192.168.3.0/24
BGM-Zone3-Amp-01 Amphe-Dante RJD1212 2.1.0 4.1.5.2 N/A 192.168.3.146 100Mbps N/A
BGM-Zone3-Amp-02 Amphe-Dante RJD1212 2.1.0 4.1.5.2 N/A 192.168.3.145 100Mbps N/A
P:
S:
Event Log:
Clock Status Monitor:

Dante Controller - Network View

File Device View Help

Grand Master Clock: BGM-DSP Domain: BGM admin (Site Administrator)

Search

Clear All

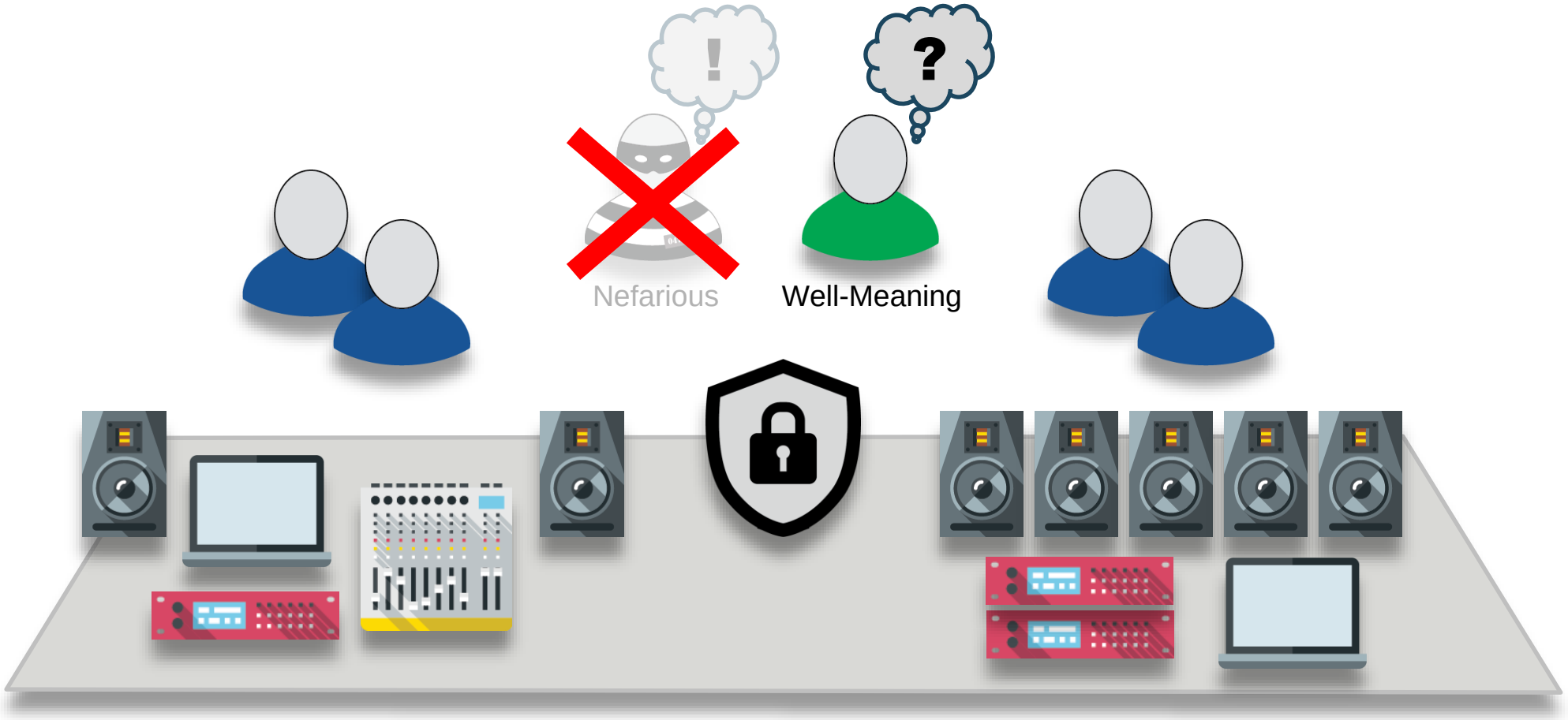
- Device Lock
- Sample Rate
- Sync to External
- Latency
- Subscriptions
- Tx Multicast Flows
- AES67
- Sample Rate Pull-up

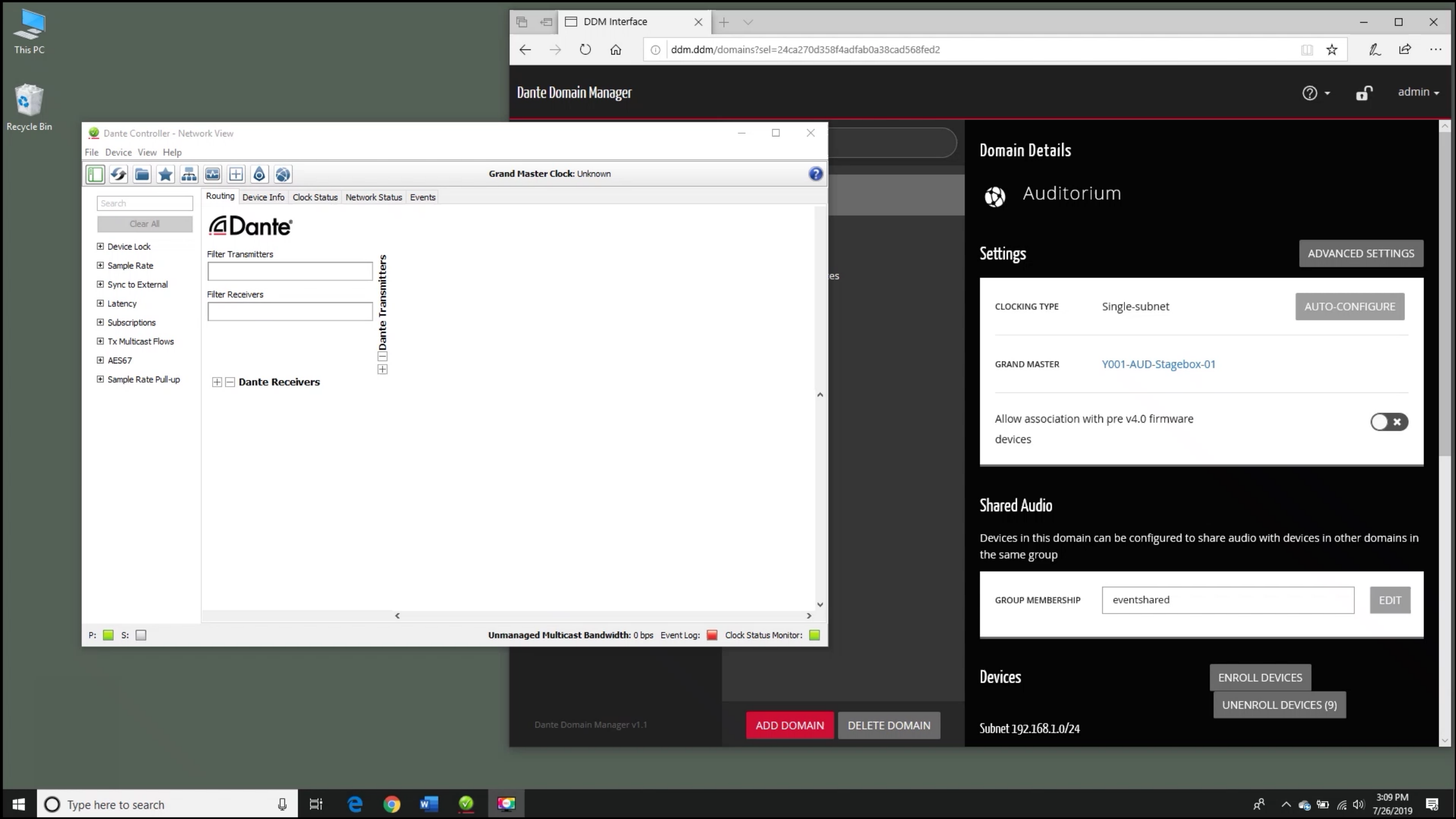
Routing | Device Info | Clock Status | Network Status | Events

Device Name	Model Name	Product Version	Dante Version	Device Lock	Primary Address	Primary Link Speed	Secondary Address	Se Li
192.168.2.0/24								
BGM-AnnouncementMic	ATND971	1.0.0	4.0.10.2	N/A	192.168.2.148	100Mbps	N/A	N/
BGM-DSP	Prism	1.0.2	4.0.7.8	N/A	192.168.2.151	1Gbps	N/A	N/
BGM-MusicPlayer	AVIO-DAI2	1.1.0	4.1.6.2	N/A	192.168.2.131	100Mbps	N/A	N/
BGM-Zone1-Amp-01	Amphe-Dante RJD1212	2.1.0	4.1.5.2	N/A	192.168.2.146	100Mbps	N/A	N/
BGM-Zone1-Amp-02	Amphe-Dante RJD1212	2.1.0	4.1.5.2	N/A	192.168.2.161	100Mbps	N/A	N/
BGM-Zone2-Amp-01	Amphe-Dante RJD1212	2.1.0	4.1.5.2	N/A	192.168.2.160	100Mbps	N/A	N/
BGM-Zone2-Amp-02	Amphe-Dante RJD1212	2.1.0	4.1.5.2	N/A	192.168.2.159	100Mbps	N/A	N/
192.168.3.0/24								
BGM-Zone3-Amp-01	Amphe-Dante RJD1212	2.1.0	4.1.5.2	N/A	192.168.3.146	100Mbps	N/A	N/
BGM-Zone3-Amp-02	Amphe-Dante RJD1212	2.1.0	4.1.5.2	N/A	192.168.3.145	100Mbps	N/A	N/

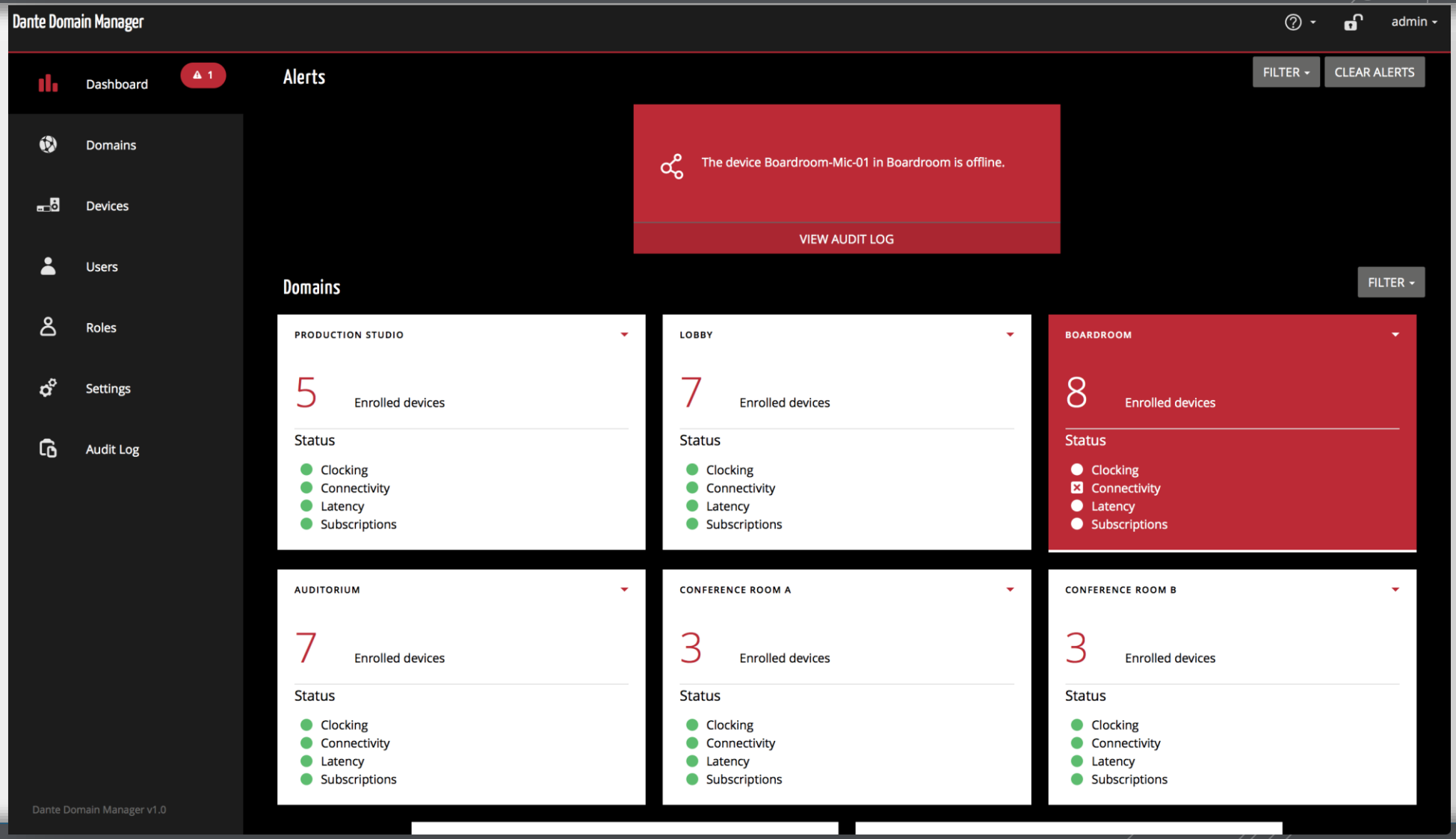
P: S: Event Log: Clock Status Monitor:

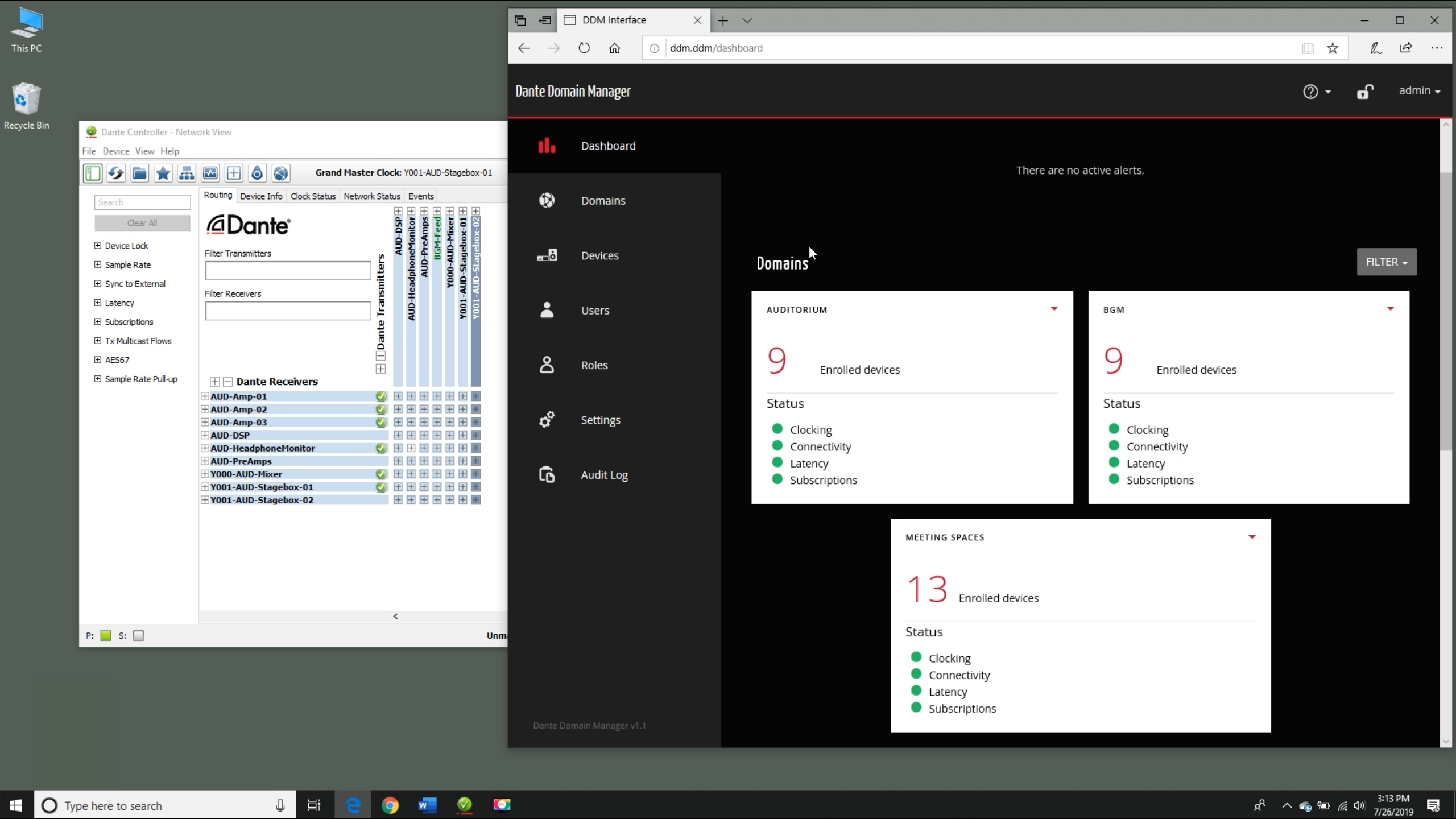
Authorize Users to Access to the Dante Network

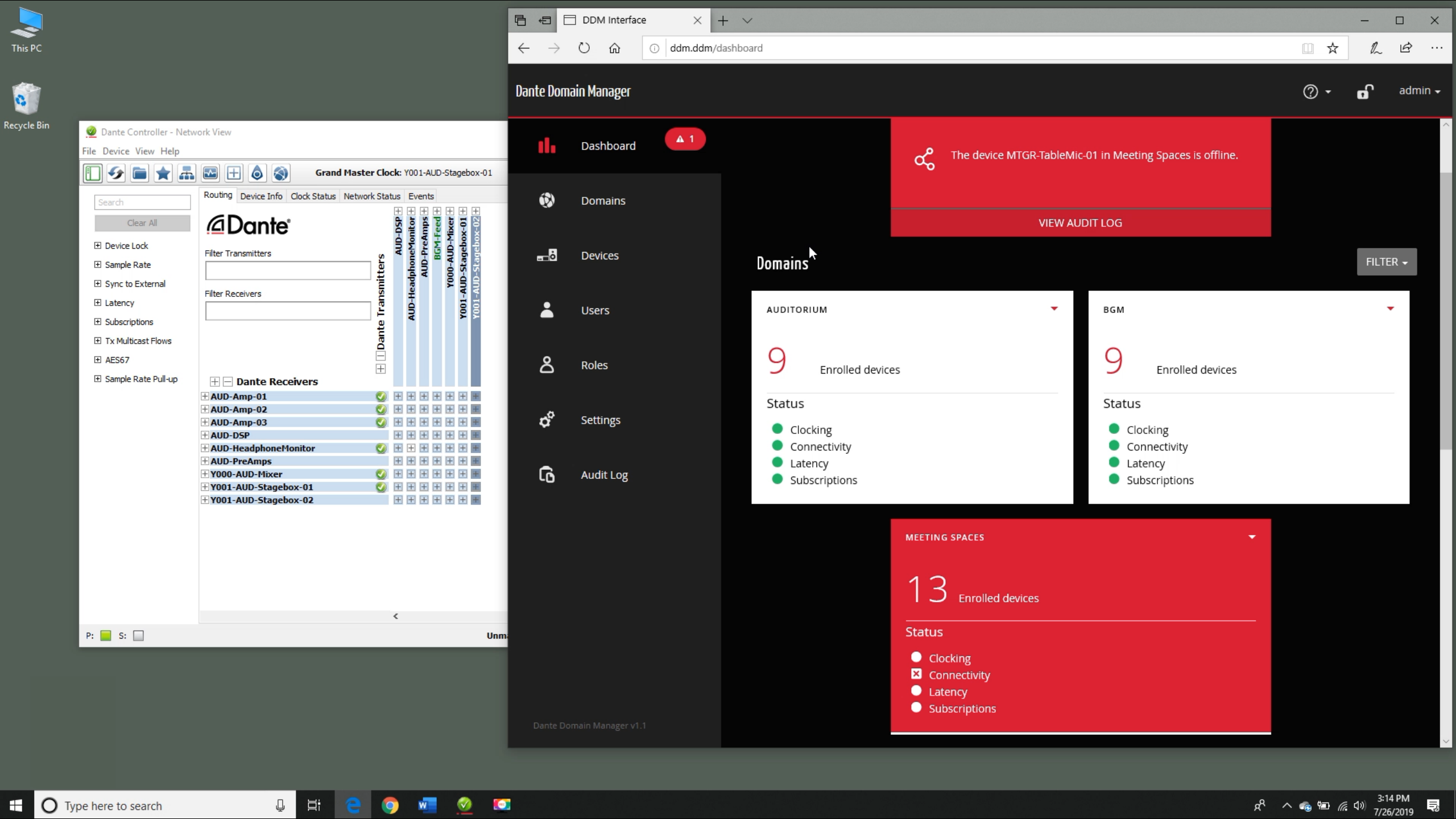



This PC
Recycle Bin
DDM Interface
ddm.ddm/domains?sel=24ca270d358f4adfab0a38cad568fed2
Dante Domain Manager
admin
Dante Controller - Network View
File Device View Help
Grand Master Clock: Unknown
Routing
Device Info
Clock Status
Network Status
Events
Search
Clear All
Device Lock
Sample Rate
Sync to External
Latency
Subscriptions
Tx Multicast Flows
AES67
Sample Rate Pull-up
Filter Transmitters
Filter Receivers
Dante Transmitters
Dante Receivers
P:
S:
Unmanaged Multicast Bandwidth: 0 bps
Event Log:
Clock Status Monitor:
Domain Details
Auditorium
Settings
ADVANCED SETTINGS
CLOCKING TYPE
Single-subnet
AUTO-CONFIGURE
GRAND MASTER
Y001-AUD-Stagebox-01
Allow association with pre v4.0 firmware devices
Shared Audio
Devices in this domain can be configured to share audio with devices in other domains in the same group
GROUP MEMBERSHIP
eventshared
EDIT
Devices
ENROLL DEVICES
UNENROLL DEVICES (9)
Subnet 192.168.1.0/24
Dante Domain Manager v1.1
ADD DOMAIN
DELETE DOMAIN
Type here to search
3:09 PM
7/26/2019

Monitor the health of the network proactively.




This PC
Recycle Bin
Dante Controller - Network View
File Device View Help
Grand Master Clock: Y001-AUD-Stagebox-01
Search
Clear All
Device Lock
Sample Rate
Sync to External
Latency
Subscriptions
Tx Multicast Flows
AES67
Sample Rate Pull-up
Routing
Device Info
Clock Status
Network Status
Events
Dante
Filter Transmitters
Filter Receivers
Dante Transmitters
AUD-DSP
AUD-HeadphoneMonitor
AUD-PreAmps
BGM-Feed
Y000-AUD-Mixer
Y001-AUD-Stagebox-01
Y001-AUD-Stagebox-02
Dante Receivers
AUD-Amp-01
AUD-Amp-02
AUD-Amp-03
AUD-DSP
AUD-HeadphoneMonitor
AUD-PreAmps
Y000-AUD-Mixer
Y001-AUD-Stagebox-01
Y001-AUD-Stagebox-02
P:
S:
DDM Interface
ddm.ddm/dashboard
Dante Domain Manager
admin
Dashboard
Domains
Devices
Users
Roles
Settings
Audit Log
Dante Domain Manager v1.1
There are no active alerts.
Domains
FILTER
AUDITORIUM
9
Enrolled devices
Status
Clocking
Connectivity
Latency
Subscriptions
BGM
9
Enrolled devices
Status
Clocking
Connectivity
Latency
Subscriptions
MEETING SPACES
13
Enrolled devices
Status
Clocking
Connectivity
Latency
Subscriptions
Type here to search
3:13 PM
7/26/2019


This PC
Recycle Bin
Dante Controller - Network View
File Device View Help
Grand Master Clock: Y001-AUD-Stagebox-01
Search
Clear All
Device Lock
Sample Rate
Sync to External
Latency
Subscriptions
Tx Multicast Flows
AES67
Sample Rate Pull-up
Routing
Device Info
Clock Status
Network Status
Events
Dante
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Dante Transmitters
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Y001-AUD-Stagebox-02
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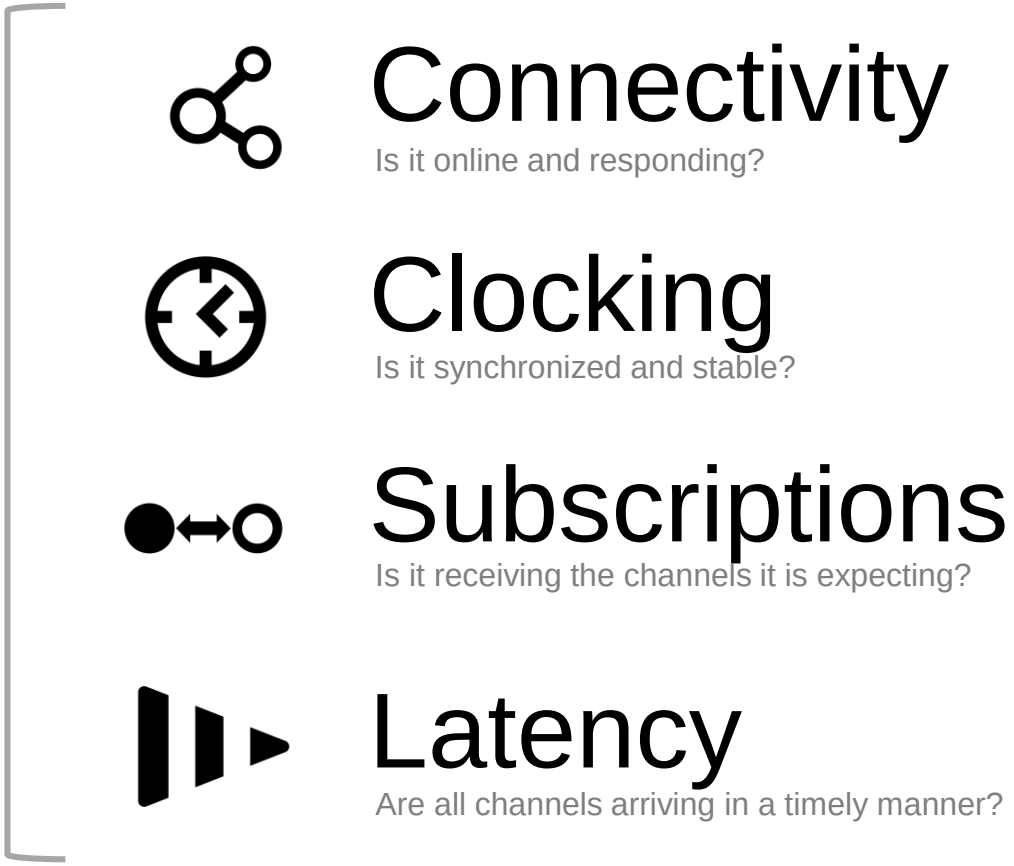
AUD-Amp-02
AUD-Amp-03
AUD-DSP
AUD-HeadphoneMonitor
AUD-PreAmps
Y000-AUD-Mixer
Y001-AUD-Stagebox-01
Y001-AUD-Stagebox-02
P:
S:
DDM Interface
ddm.ddm/dashboard
Dante Domain Manager
admin
Dashboard
1
Domains
Devices
Users
Roles
Settings
Audit Log
Dante Domain Manager v1.1
The device MTGR-TableMic-01 in Meeting Spaces is offline.
VIEW AUDIT LOG
Domains
FILTER
AUDITORIUM
9
Enrolled devices
Status
Clocking
Connectivity
Latency
Subscriptions
BGM
9
Enrolled devices
Status
Clocking
Connectivity
Latency
Subscriptions
MEETING SPACES
13
Enrolled devices
Status
Clocking
Connectivity
Latency
Subscriptions
Type here to search
3:14 PM
7/26/2019

Monitor the health of the network proactively.

Categorized Reports



Connectivity

Is it online and responding?

Clocking

Is it synchronized and stable?

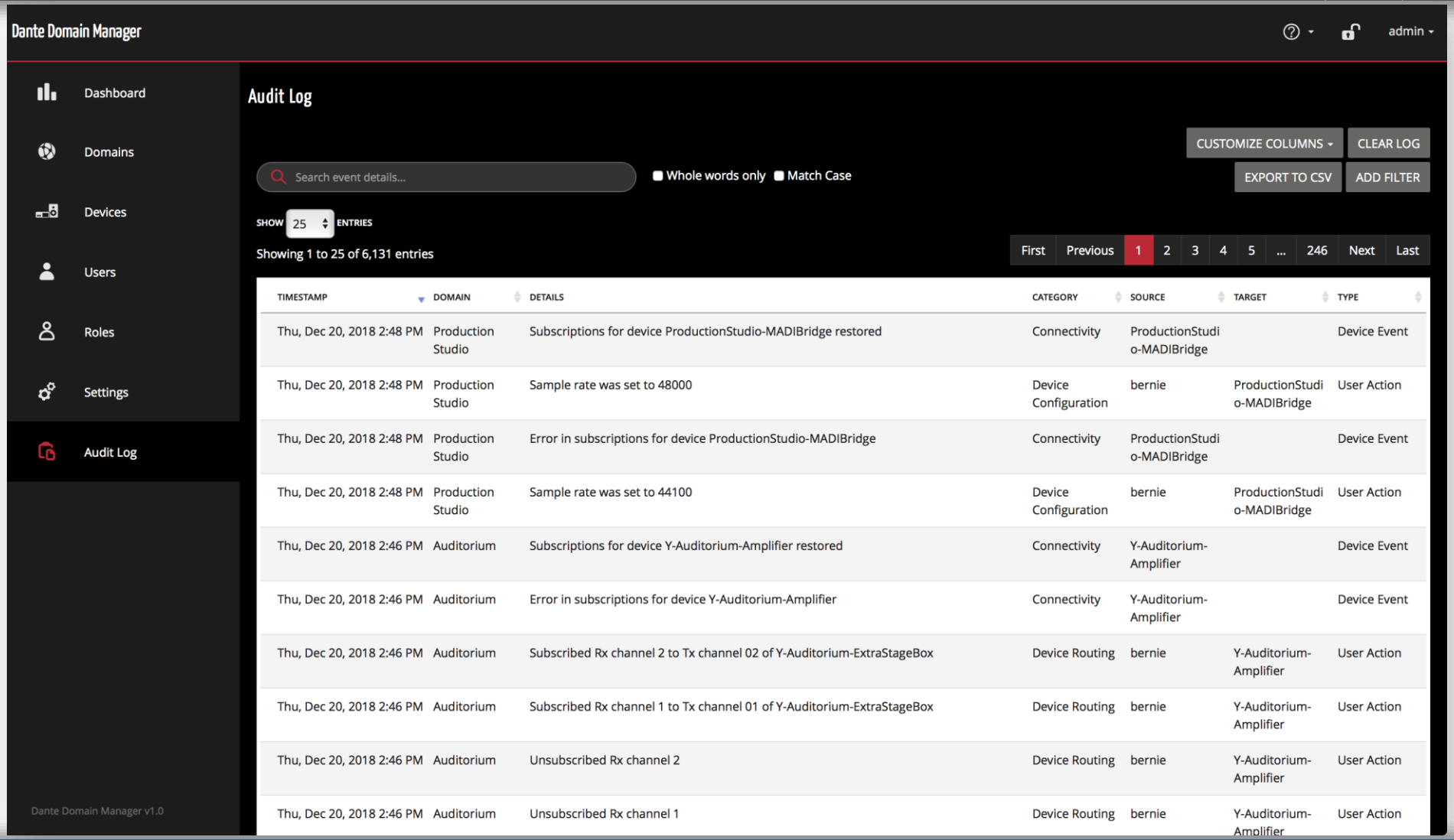
Subscriptions

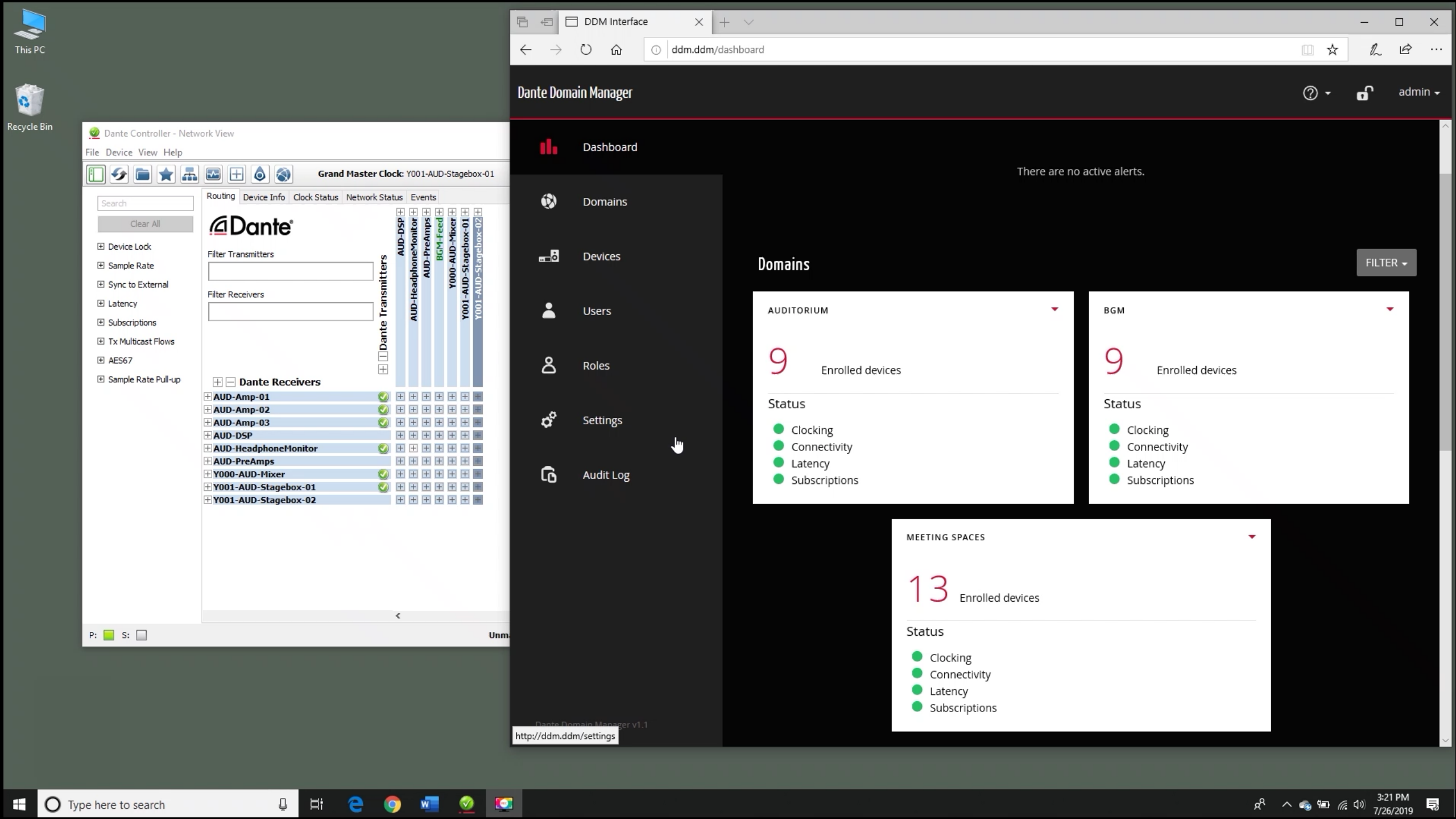
Is it receiving the channels it is expecting?

Latency

Are all channels arriving in a timely manner?

Log usage and status to troubleshoot objectively




This PC
Recycle Bin
Dante Controller - Network View
File Device View Help
Grand Master Clock: Y001-AUD-Stagebox-01
Search
Clear All
Device Lock
Sample Rate
Sync to External
Latency
Subscriptions
Tx Multicast Flows
AES67
Sample Rate Pull-up
Routing
Device Info
Clock Status
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Events
Dante
Filter Transmitters
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Y001-AUD-Stagebox-02
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AUD-Amp-03
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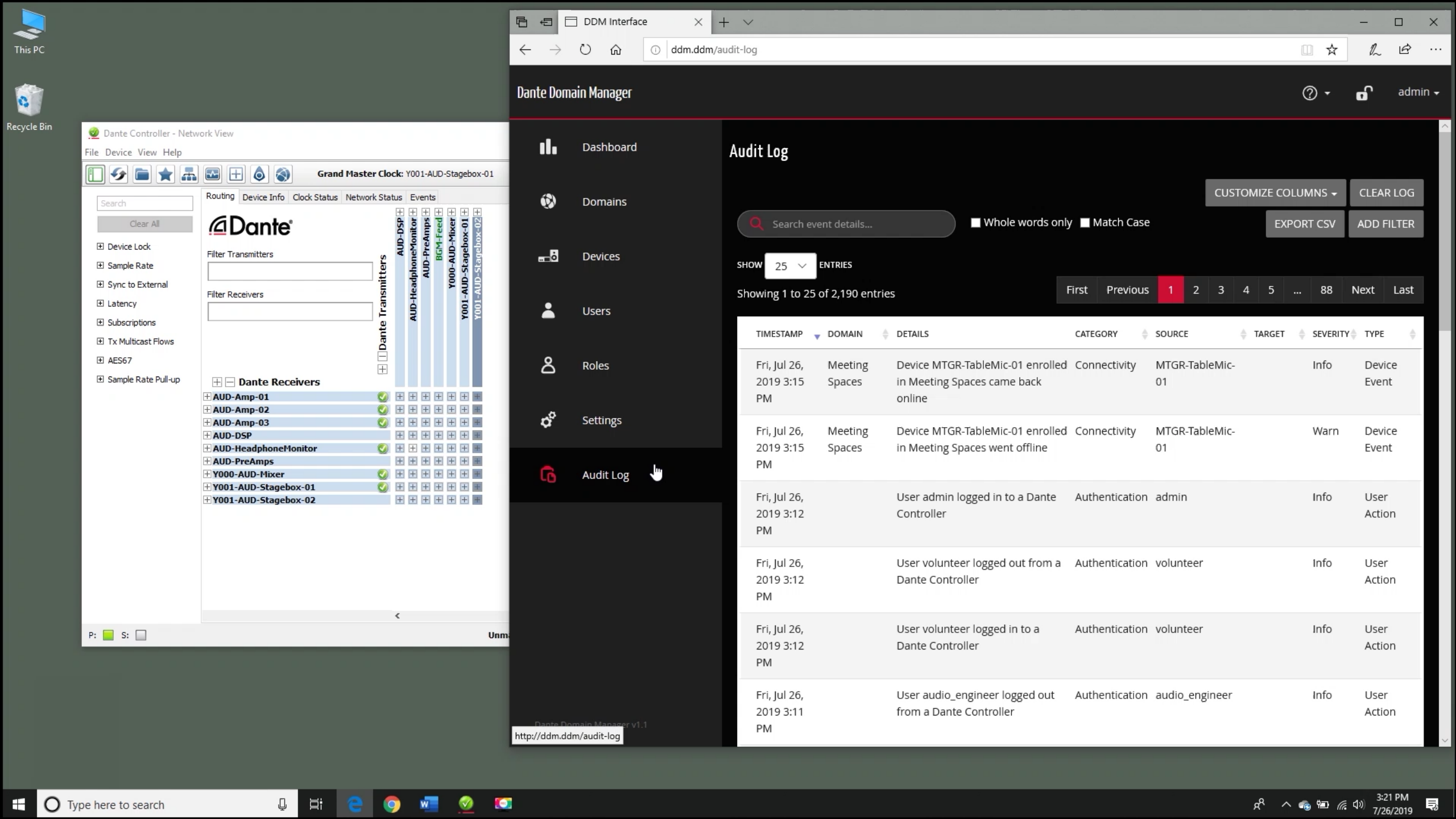
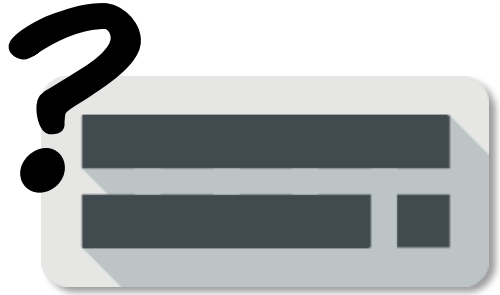
AUD-HeadphoneMonitor
AUD-PreAmps
Y000-AUD-Mixer
Y001-AUD-Stagebox-01
Y001-AUD-Stagebox-02
P:
S:
DDM Interface
ddm.ddm/dashboard
Dante Domain Manager
admin
Dashboard
Domains
Devices
Users
Roles
Settings
Audit Log
There are no active alerts.
Domains
FILTER
AUDITORIUM
9
Enrolled devices
Status
Clocking
Connectivity
Latency
Subscriptions
BGM
9
Enrolled devices
Status
Clocking
Connectivity
Latency
Subscriptions
MEETING SPACES
13
Enrolled devices
Status
Clocking
Connectivity
Latency
Subscriptions
Dante Domain Manager v1.1
http://ddm.ddm/settings
Type here to search
3:21 PM
7/26/2019


This PC
Recycle Bin
Dante Controller - Network View
File Device View Help
Grand Master Clock: Y001-AUD-Stagebox-01
Routing
Device Info
Clock Status
Network Status
Events
Search
Clear All
Device Lock
Sample Rate
Sync to External
Latency
Subscriptions
Tx Multicast Flows
AES67
Sample Rate Pull-up
Filter Transmitters
Filter Receivers
Dante Transmitters
AUD-DSP
AUD-HeadphoneMonitor
AUD-PreAmps
BGM-Feed
Y000-AUD-Mixer
Y001-AUD-Stagebox-01
Y001-AUD-Stagebox-02
Dante Receivers
AUD-Amp-01
AUD-Amp-02
AUD-Amp-03
AUD-DSP
AUD-HeadphoneMonitor
AUD-PreAmps
Y000-AUD-Mixer
Y001-AUD-Stagebox-01
Y001-AUD-Stagebox-02
P:
S:
DDM Interface
ddm.ddm/audit-log
Dante Domain Manager
admin
Dashboard
Domains
Devices
Users
Roles
Settings
Audit Log
Audit Log
CUSTOMIZE COLUMNS
CLEAR LOG
Search event details...
Whole words only
Match Case
EXPORT CSV
ADD FILTER
SHOW 25 ENTRIES
Showing 1 to 25 of 2,190 entries
First Previous 1 2 3 4 5 ... 88 Next Last
TIMESTAMP DOMAIN DETAILS CATEGORY SOURCE TARGET SEVERITY TYPE
Fri, Jul 26, 2019 3:15 PM Meeting Spaces Device MTGR-TableMic-01 enrolled in Meeting Spaces came back online Connectivity MTGR-TableMic-01 Info Device Event
Fri, Jul 26, 2019 3:15 PM Meeting Spaces Device MTGR-TableMic-01 enrolled in Meeting Spaces went offline Connectivity MTGR-TableMic-01 Warn Device Event
Fri, Jul 26, 2019 3:12 PM User admin logged in to a Dante Controller Authentication admin Info User Action
Fri, Jul 26, 2019 3:12 PM User volunteer logged out from a Dante Controller Authentication volunteer Info User Action
Fri, Jul 26, 2019 3:12 PM User volunteer logged in to a Dante Controller Authentication volunteer Info User Action
Fri, Jul 26, 2019 3:11 PM User audio_engineer logged out from a Dante Controller Authentication audio_engineer Info User Action
http://ddm.ddm/audit-log
Type here to search
3:21 PM
7/26/2019

What is a Server? *ISO Files, Bare Metal, Hypervisors*

What is a server?

- A server is a computer program or a device that provides functionality for other programs or devices, called "clients."
  - Examples: DNS, DHCP, Mail, LDAP, SNMP, Web Server, File Server, etc.
- Server hardware typically is more powerful and expensive than the clients that connect to them since they are often left unmonitored and on all the time.
- Since servers are usually accessed over a network, many lack a GUI and run without a computer monitor or input device and are instead accessed via a web browser, SSH, PowerShell, or management console.



How to install DDM

- Dante Domain Manager software is distributed as an ISO file.

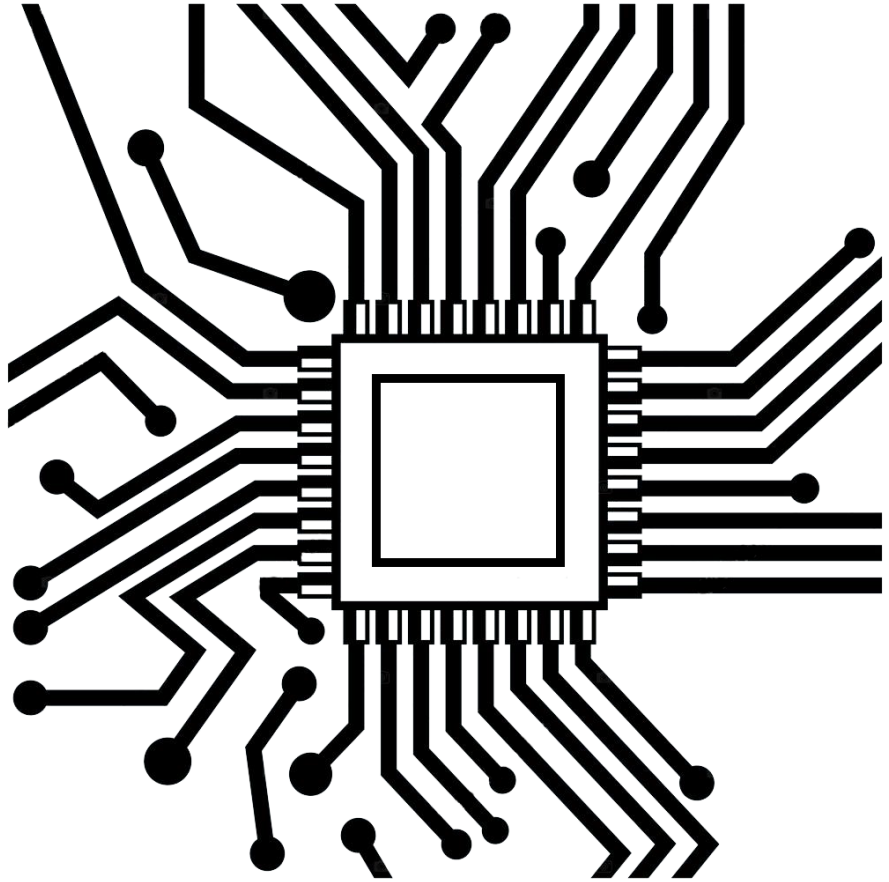
- There are two options for installing DDM Software:
  - Create a bootable USB drive for installing DDM on a bare metal machine
  - Import the ISO directly into a virtualization platform such as VirtualBox, VMWare, or Hyper-V

vmware®

Microsoft Hyper-V

Bare Metal Explained

- Bare metal is just another way of saying Dedicated Server
- Installing on a bare metal machine means you are installing directly onto the hardware without the need for a pre-installed OS or hypervisor
- The benefit of a bare metal install is the service (i.e. DDM) has direct access to underlying hardware technology without any OS or hypervisor overhead



Hypervisors Explained

- A hypervisor creates a *virtual computer* on which you can install another operating system and the software you'd like to run.
  - Example: Running Windows on a Mac using Parallels Desktop
- There are two types of Hypervisors:
  - Type 1 Hypervisors sit directly on the computer hardware, no underlying OS is required. Example: VMWare ESXi
  - Type 2 Hypervisors require an underlying OS. Examples: VMWare Fusion and VirtualBox
- Hypervisors allow for host solutions from different providers that may have different or even conflicting OS requirements on a single machine.

Discovery: *DNS, mDNS, DNS-SD, SRV Records*

DNS: Multi Layer Look-Up

If everything is run by IP Addresses, how do I get to a web site?

https://www.audinate.com/certify/

Protocol | Server Domain Name or IP Address | Folder/Request

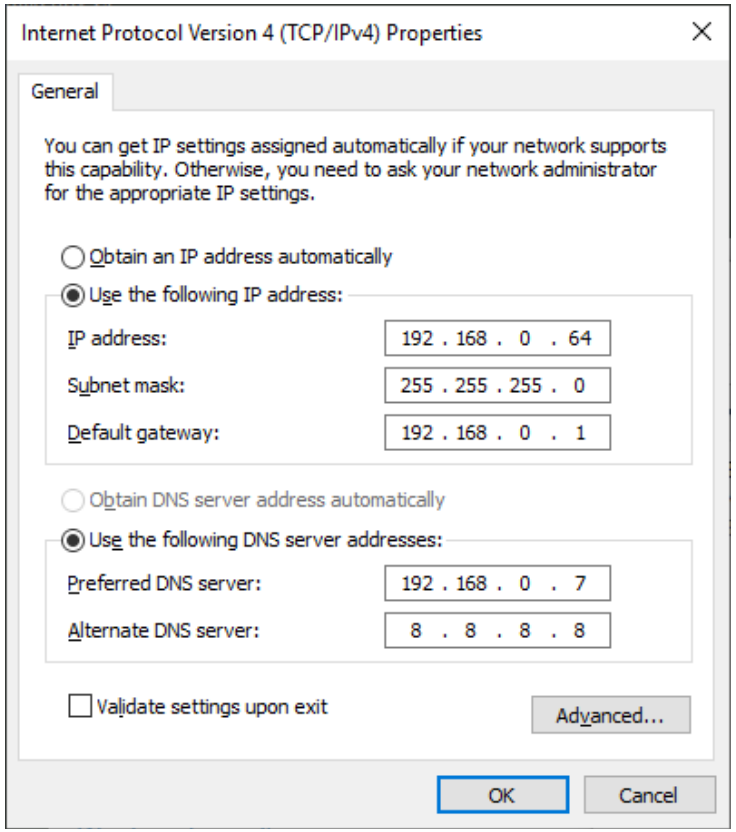
DNS: Multi Layer Look-Up

If everything is run by IP Addresses, how do I get to a web site?

https://www.audinate.com/certify/

https://45.33.44.50/certify/

DNS: Multi Layer Look-Up



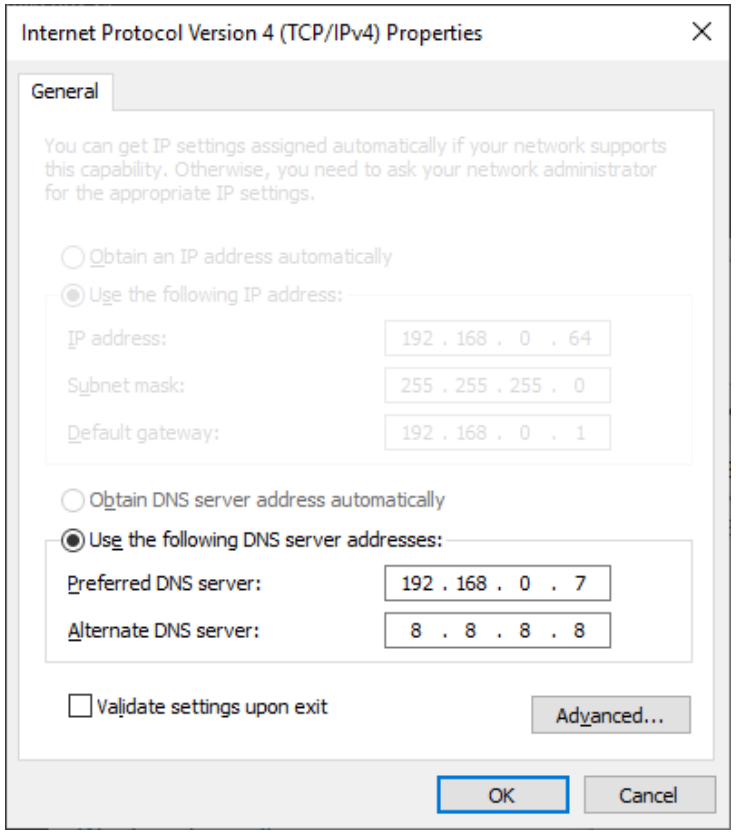
DNS (Domain Name Service)

Resolves names to IP Addresses

https://www.audinate.com/certify/

https://45.33.44.50/certify/

DNS: Multi Layer Look-Up



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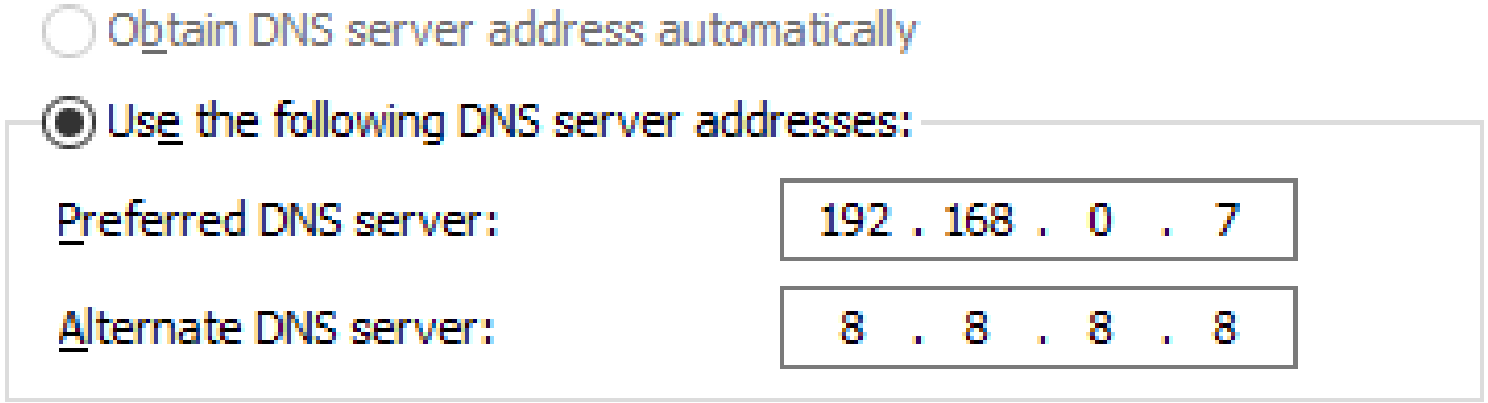
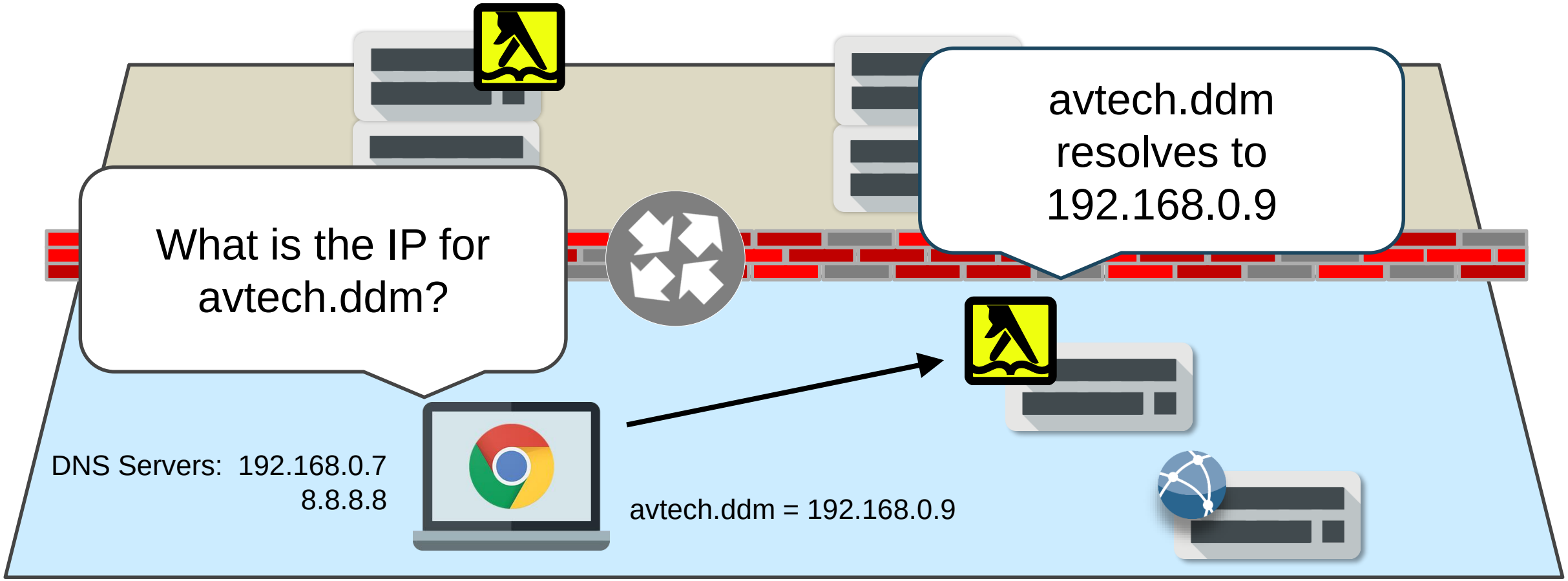
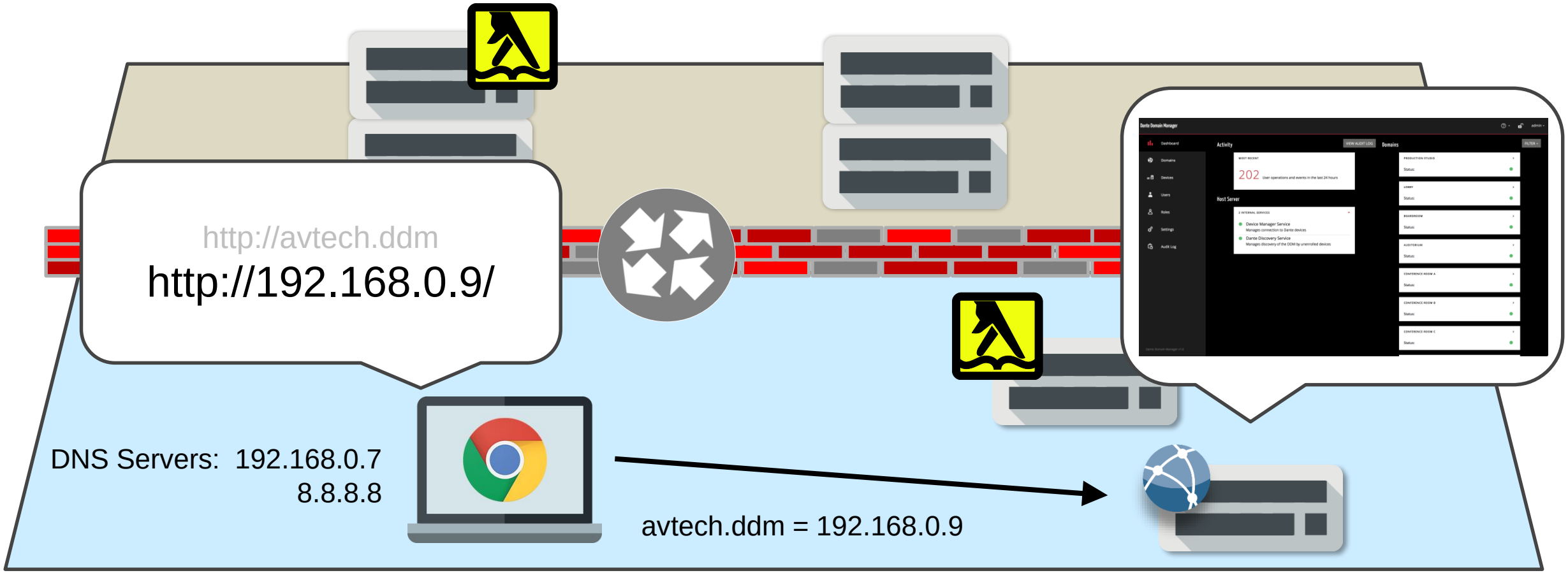


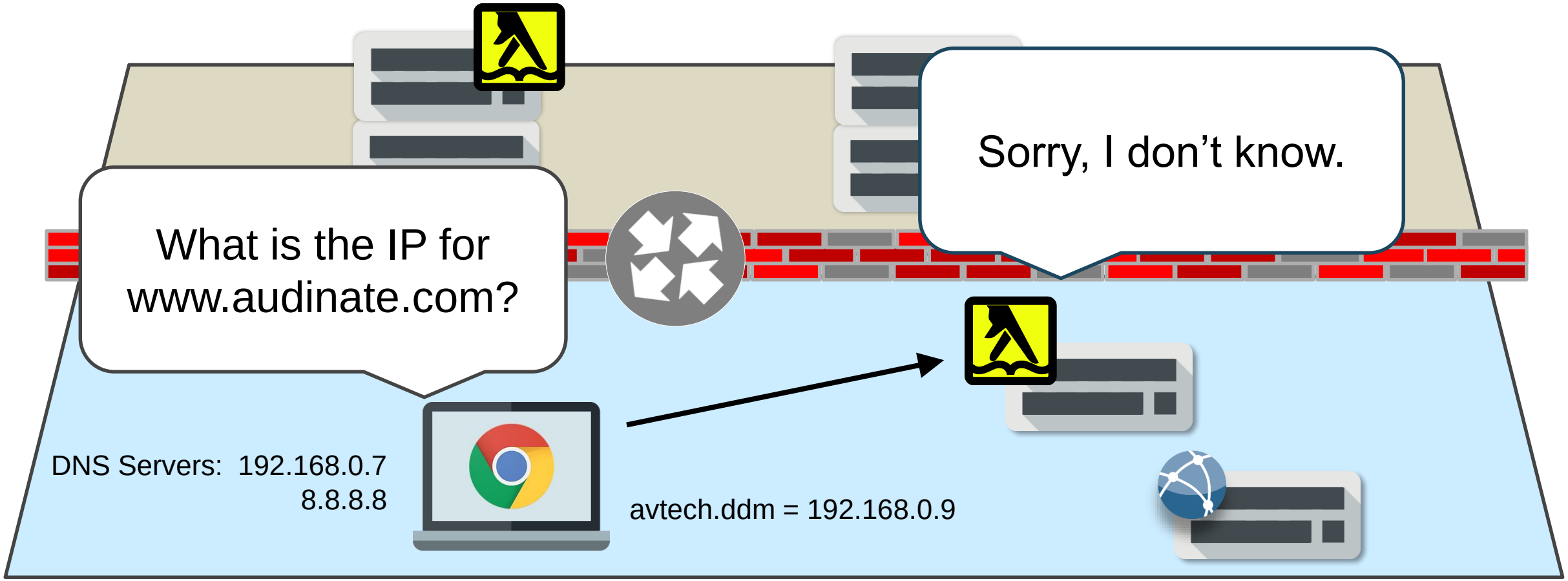
DNS: Multi Layer Look-Up



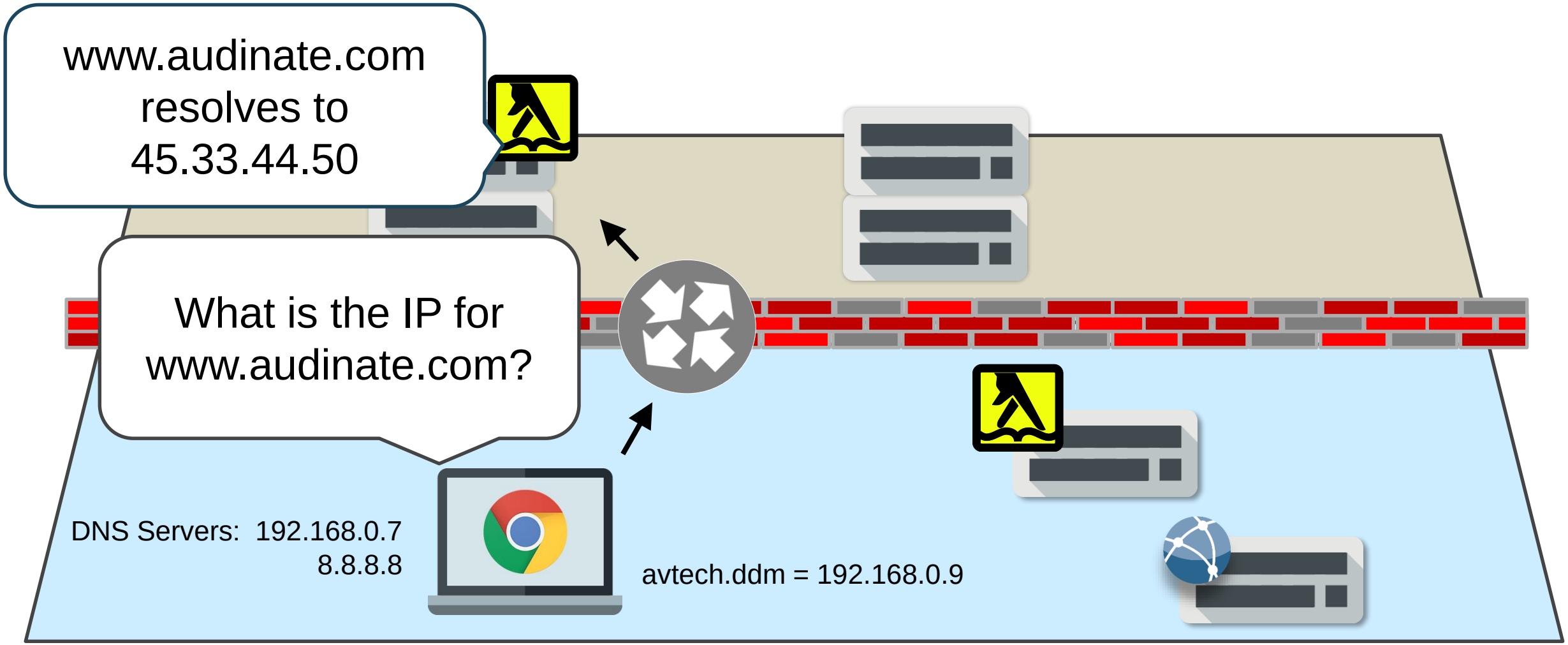
DNS: Multi Layer Look-Up



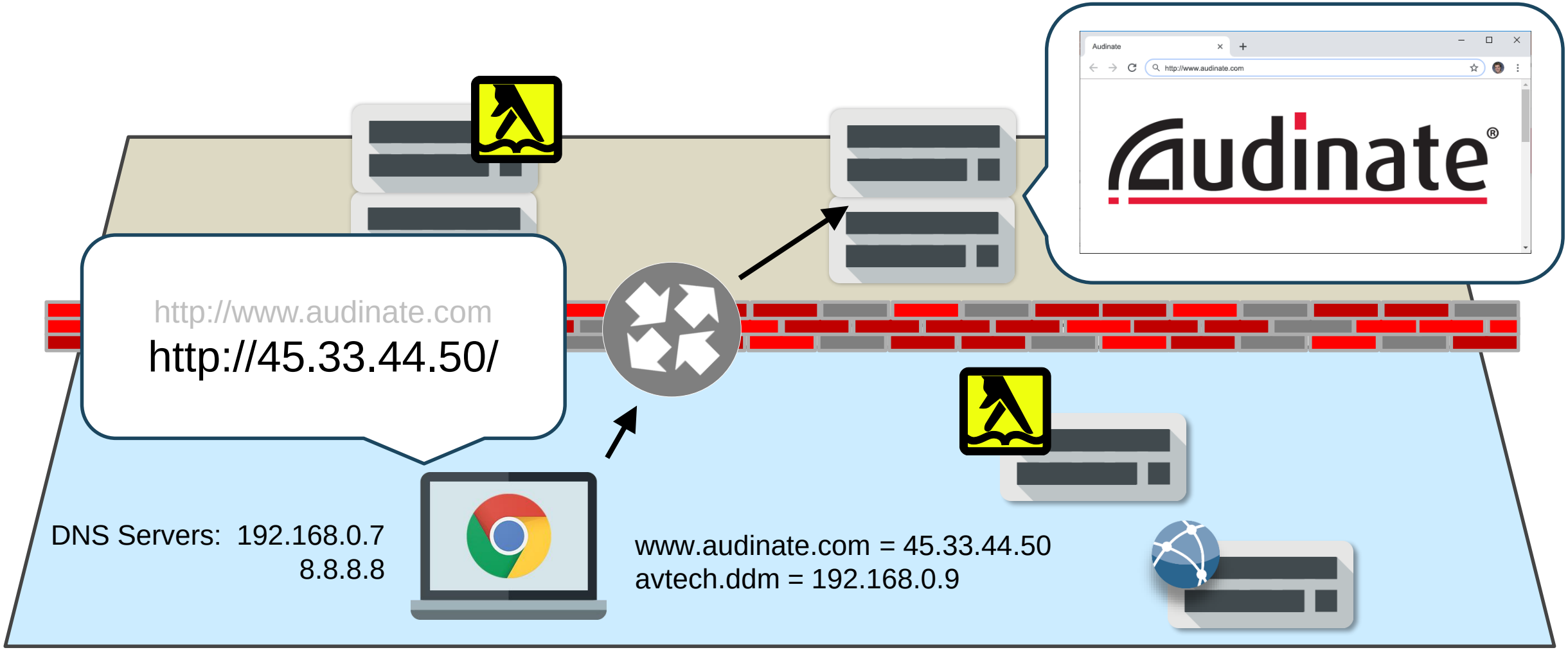
DNS: Multi Layer Look-Up



DNS: Multi Layer Look-Up

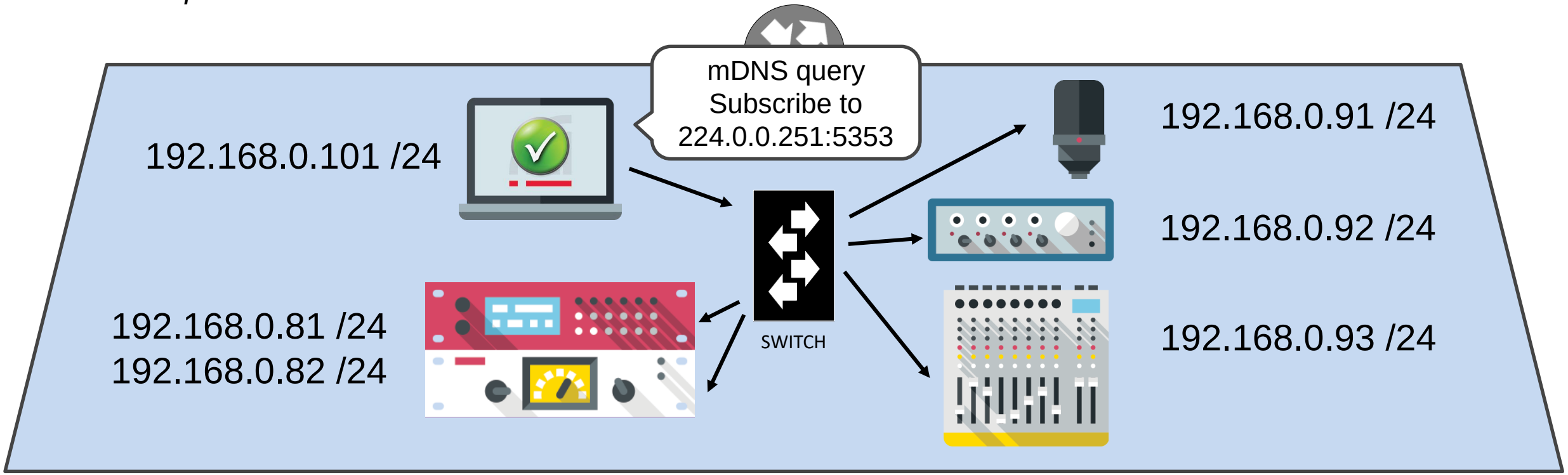


DNS: Multi Layer Look-Up



Dante Discovery mDNS

- Dante uses mDNS to discover devices on the network.
  The “m” stands for multicast.
  Subscription Address/Port: 224.0.0.251:5353



**Note: The Dante API takes over to get more details about devices*

Dante Discovery mDNS

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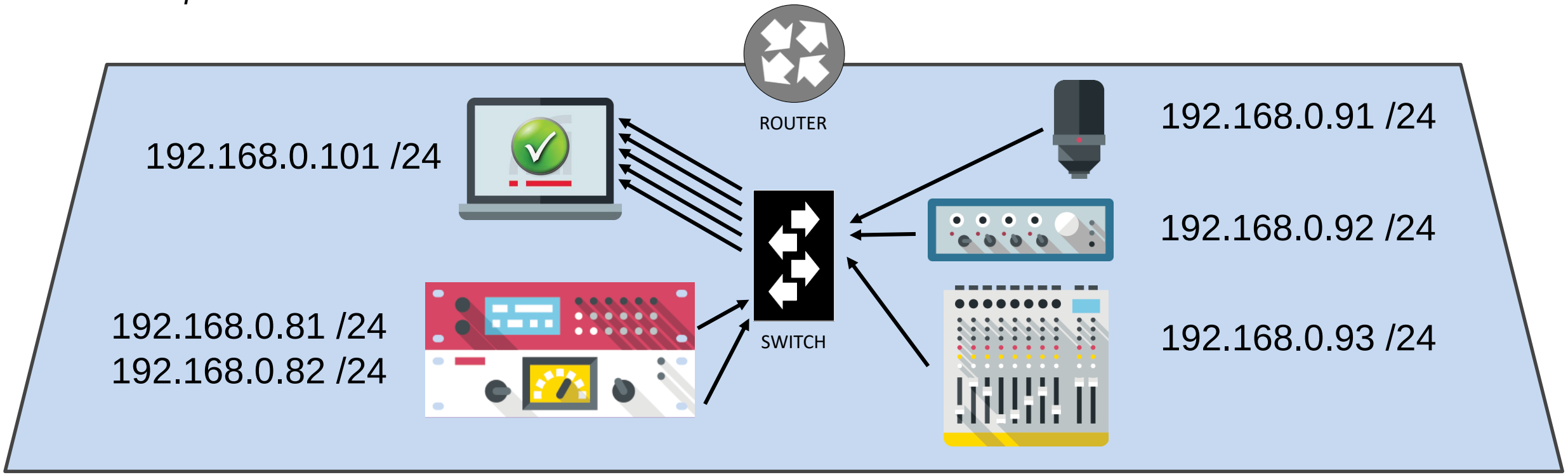
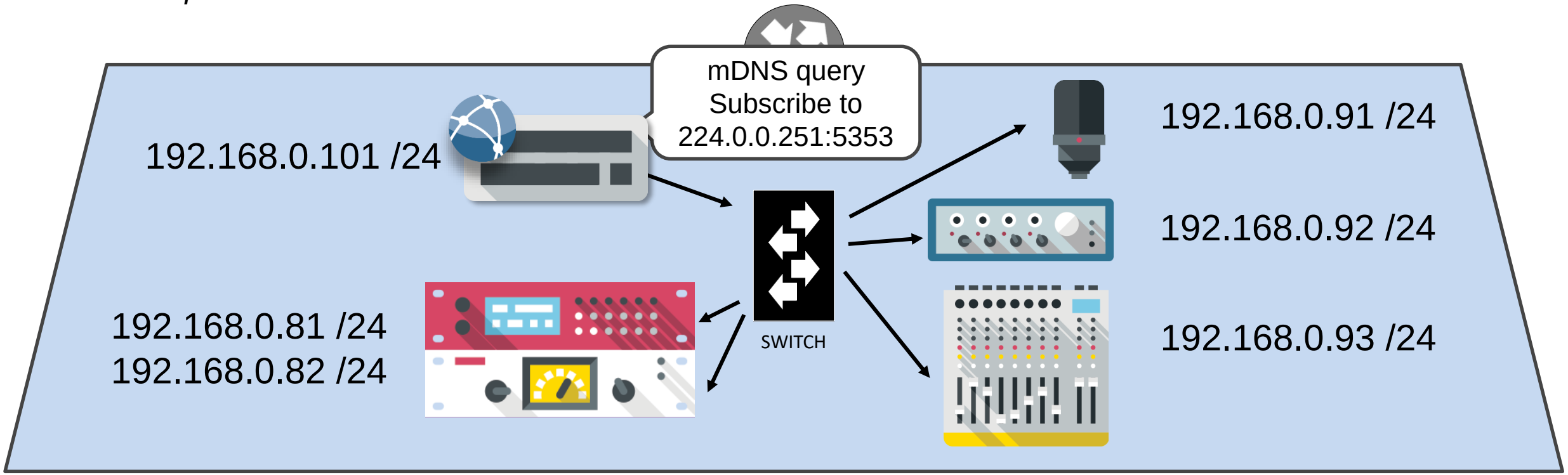
  Subscription Address/Port: 224.0.0.251:5353



**Note: The Dante API takes over to get more details about devices*

Dante Domain Manager Discovery: Single Subnet

- Dante uses mDNS to discover devices on the network.
  The “m” stands for multicast.
  Subscription Address/Port: 224.0.0.251:5353



**Note: The Dante API takes over to get more details about devices*

Dante Domain Manager Discovery: Single Subnet

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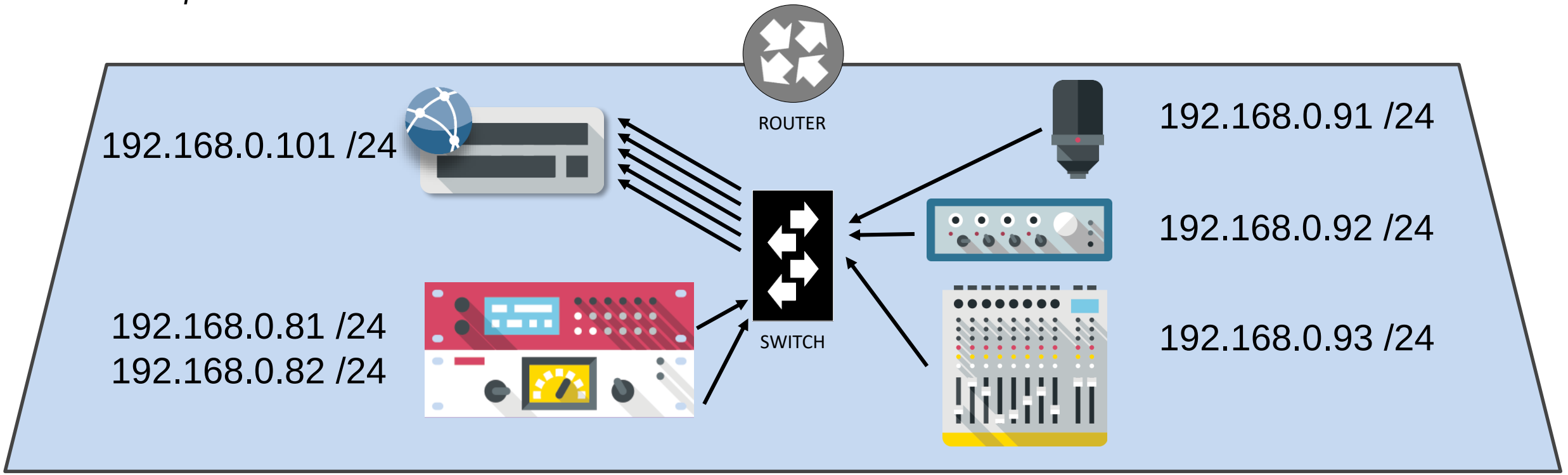
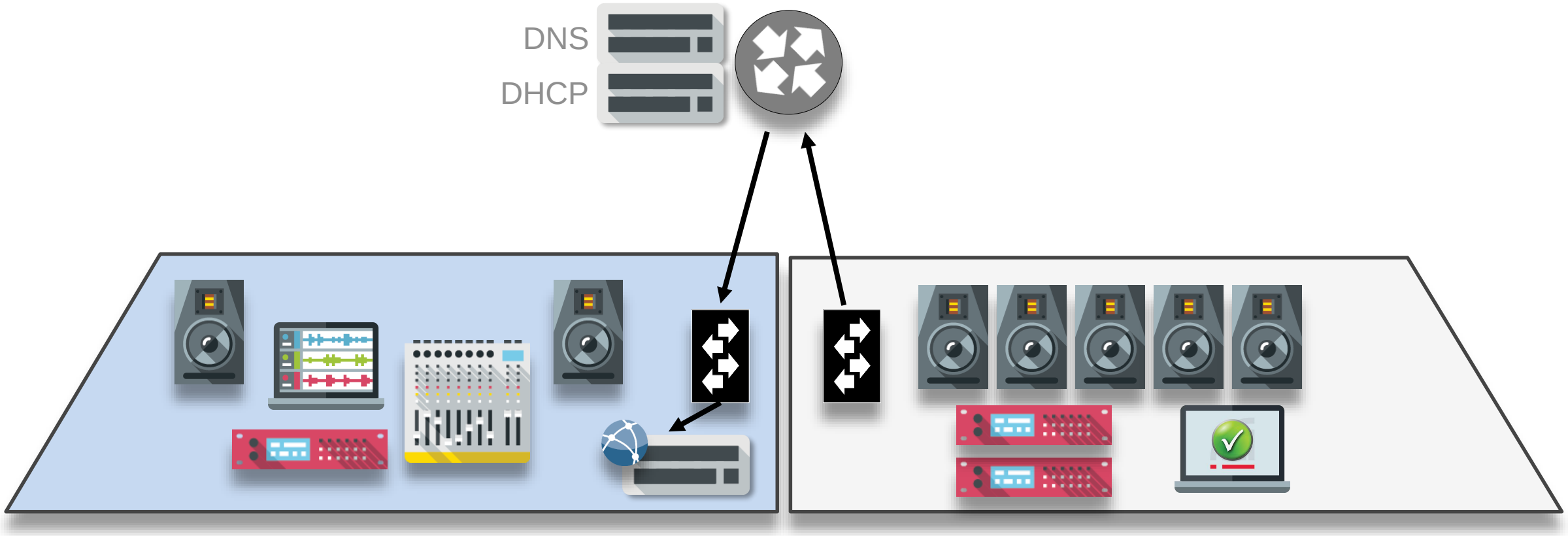
  Subscription Address/Port: 224.0.0.251:5353



**Note: The Dante API takes over to get more details about devices*

Dante Domain Manager Discovery: Multiple Subnets – DNS-SD



Anatomy of a SRV Record

The following example is for Dante controllers, using the domain name ddm :

Service	*Proto*	*Name*	*TTL*	*Class*	*Record*	*Priority*	*Weight*	*Port*	*Target*
default._dante-ddm-c._tcp.ddm.			3600	IN	SRV	0	0	8443	ddm.ddm
default._dante-ddm-c._tcp.ddm.			3600	IN	TXT	“”			

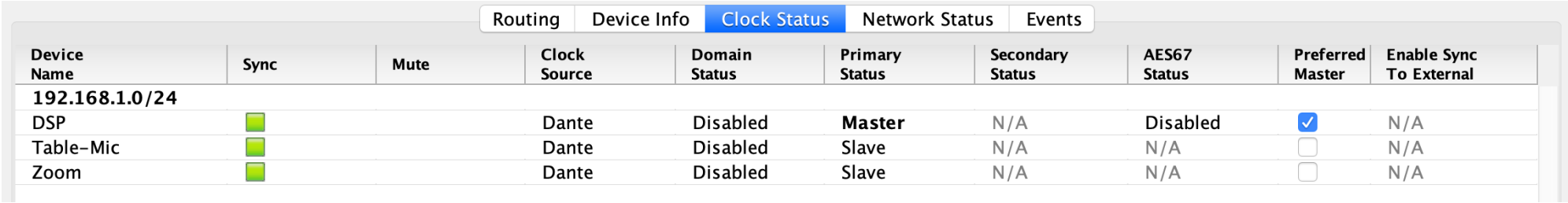
The following example is for Dante devices, using the domain name ddm :

Service	*Proto*	*Name*	*TTL*	*Class*	*Record*	*Priority*	*Weight*	*Port*	*Target*
default._dante-ddm-d._udp.ddm.			3600	IN	SRV	0	0	8000	ddm.ddm
default._dante-ddm-d._udp.ddm.			3600	IN	TXT	""			

Dante Domain Manager: *Clocking Considerations*

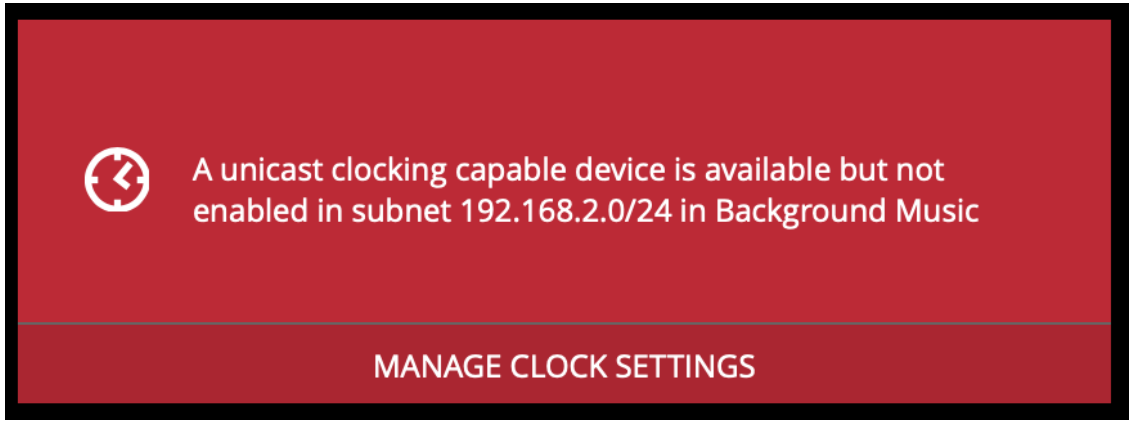
Clocking: Single Subnet Domains & Networks

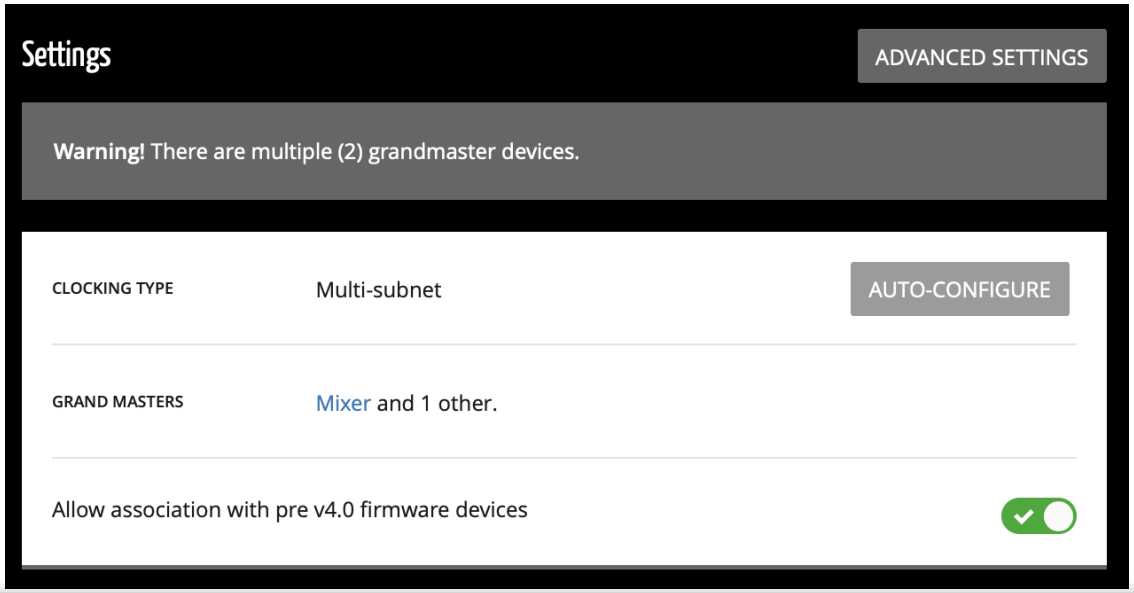
- Clocking is on a per domain basis
  - Enrolling a device in a domain means it will follow the clock master in it's domain
  - A device in a different domain, but in the same IP subnet will be ignored
  - Allows you to break up "flat" networks into multiple clocking domains
- Multicast PTP is used by default
- Uses the same clock election method as an unmanaged network
  - Can be customized in in Dante Controller/Dante Domain Manager (i.e. Preferred Master and/or Enable Sync to External)



Clocking: Multiple Subnet Domains

- **When You Enroll a Device From a Different Subnet into a Domain:**
  - The DDM server will alert you clocking needs to be configured.
  - Navigate to the **Domain** page to adjust clocking.
    - You can click **Auto-Configure** to have DDM setup the clocking automatically
    - You can manually configure the clocking in **Advanced Settings**

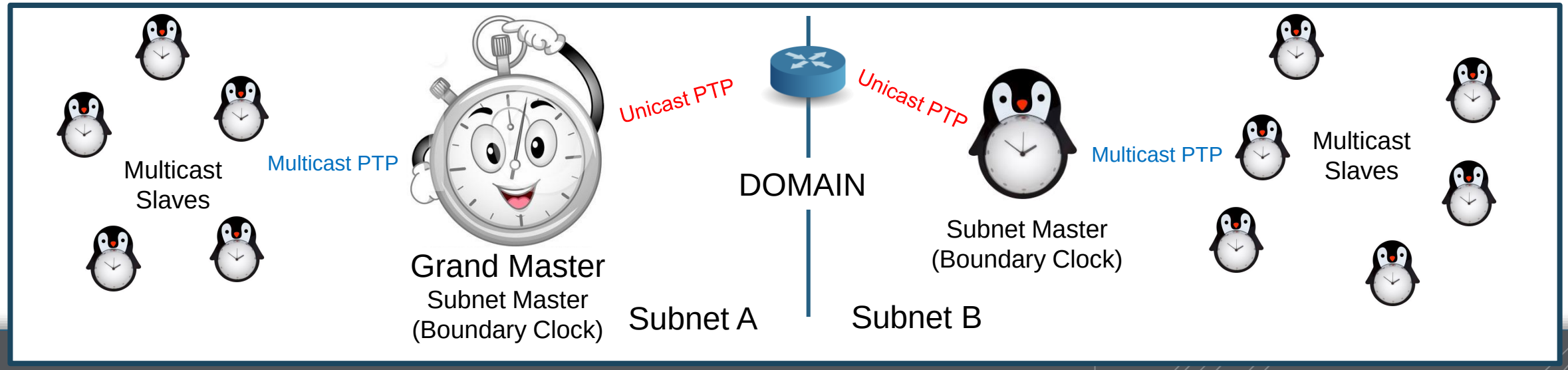




Clocking: Multiple Subnet Domains

In the case of domains that span multiple subnets:

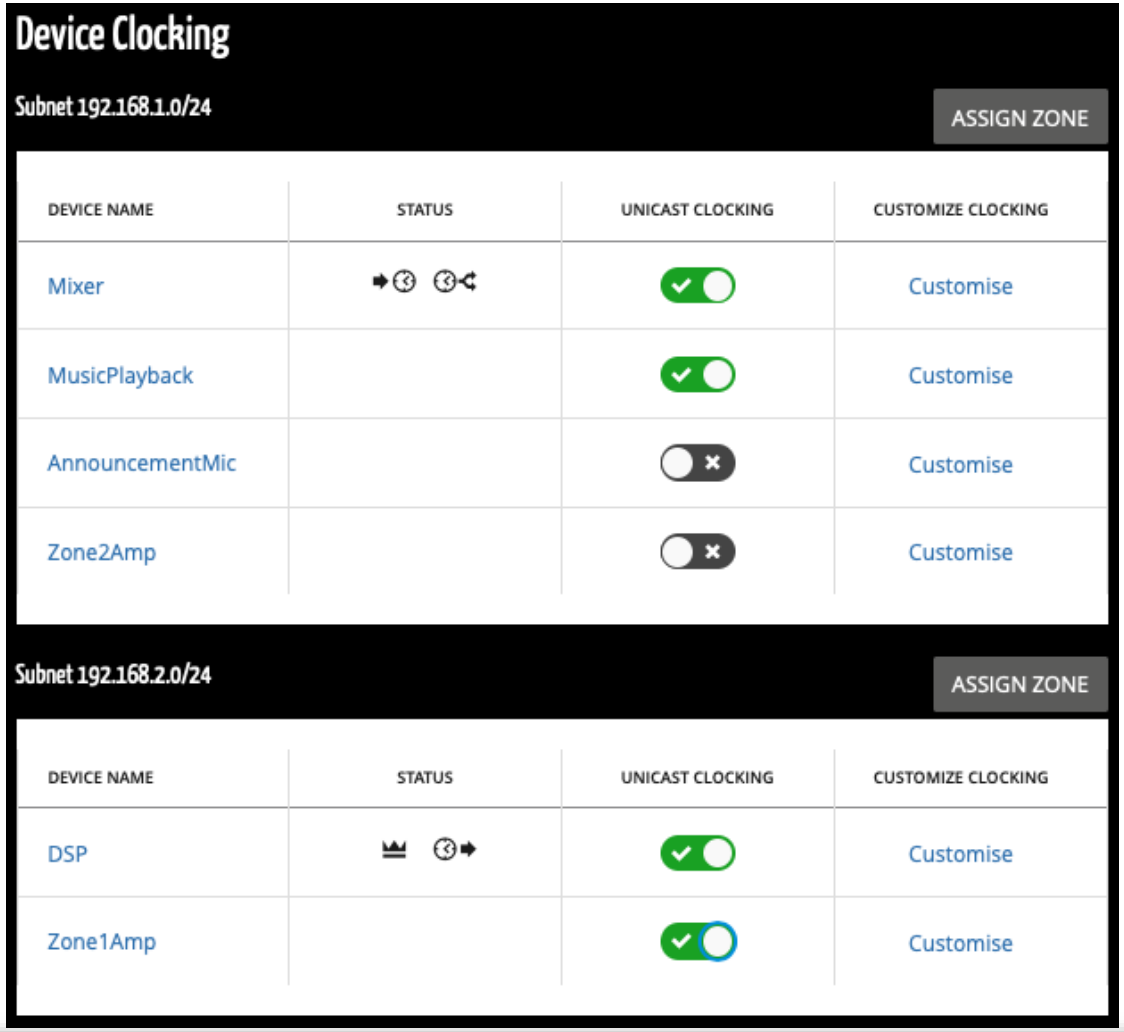
- One Grand Master clock device is automatically elected (or manually specified)
- One “boundary clock” device will be elected (or specified) for each subnet
  - The boundary clocks receive unicast PTP from the Grand Master
  - The boundary clocks transmit multicast PTP to the Slaves within their subnet
  - *Note: The Grand Master clock can act as the boundary clock for its own subnet*



Clocking: Advanced Options

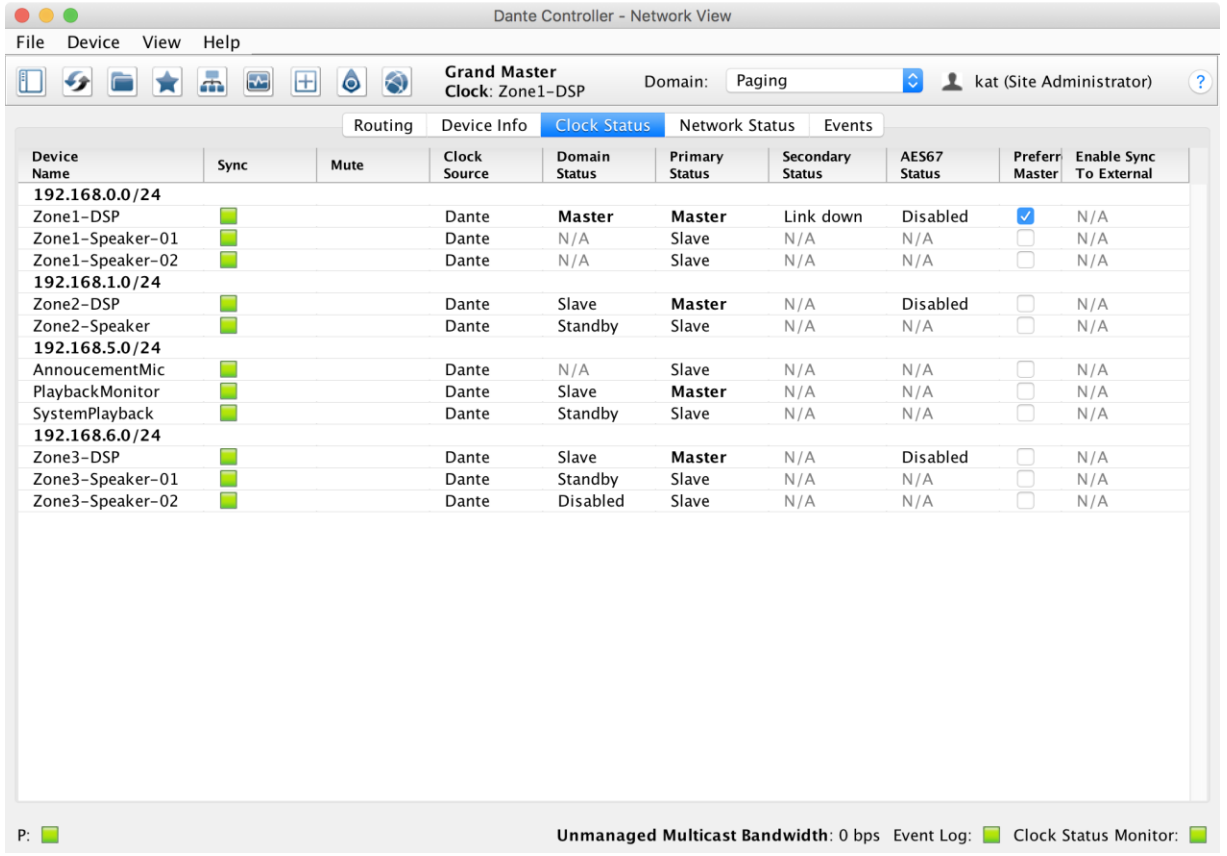
- You can define which devices you wish to act as subnet masters (boundary clocks) on the Advanced Clocking options page by enabling unicast clocking for those specific devices.

- A backup unicast clocking device is encouraged in each subnet.



Clocking: Dante Controller View

- The Grand Master Clock for the domain is shown at the top.
- In the Clock status tab the Domain Grand Master clock is shown as Master in the **Domain Status** column and is shown
- Boundary Clocks are listed as Master in the Primary (and Secondary if applicable) Column(s)
- *Note: If the Grandmaster clock for the domain is in a different domain (i.e. through Shared Audio Groups) or a non Dante device Dante Controller may display Unknown as Grand Master Clock*



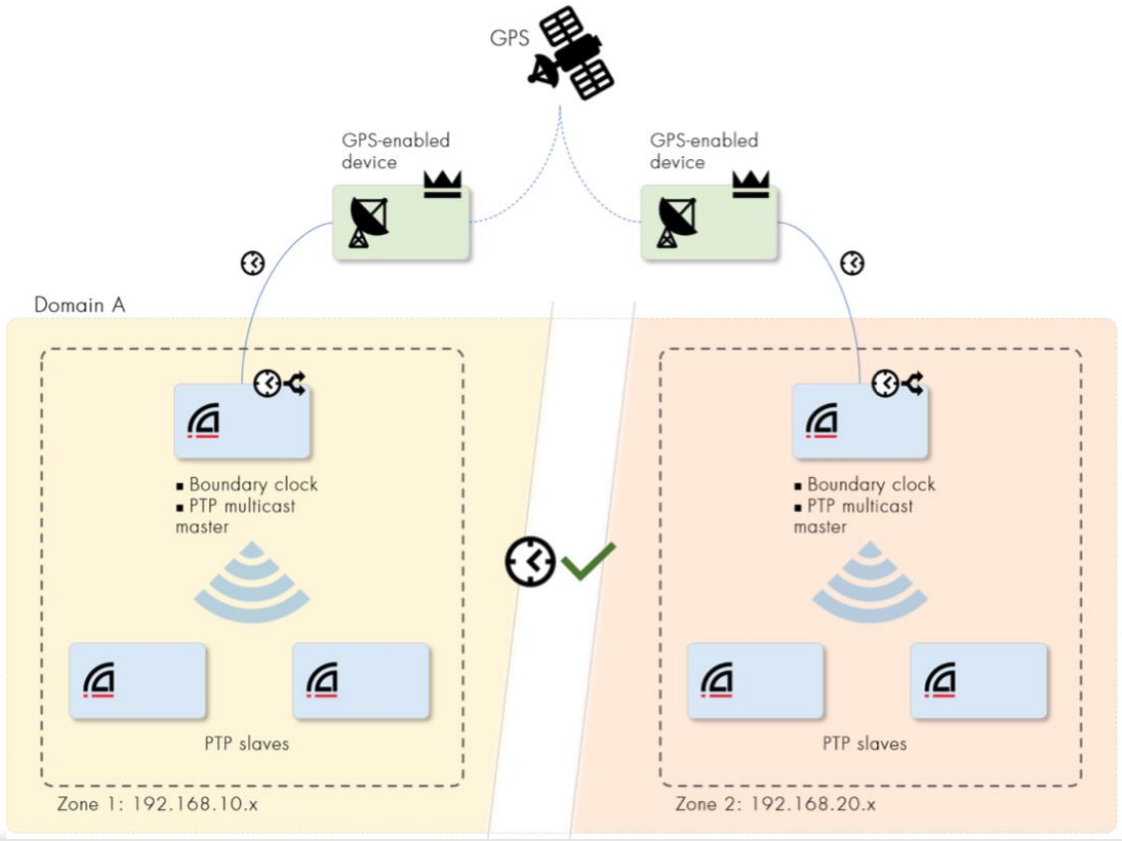
Clocking: Devices Capable Of Becoming A Boundary Clock

Not all Dante devices are capable of becoming a boundary clock:

- Devices associated in domains in legacy mode (pre 4.0 firmware)
- Computers running DVS or Via
- Legacy Ultimo devices
  - *Note**: Ultimo X** and adapter module chipsets can – but more powerful chipsets (i.e. Brooklyn II) should be preferred.*
  - Chipset type can be determined in Dante Control Device View > Status Tab
  - Legacy Ultimo Devices are listed as ***Ultimo*** or ***Ultimo4***
  - Ultimo X devices are listed as ***UltimoX*** or ***UltimoX4***

Clocking: Advanced Clocking Zones

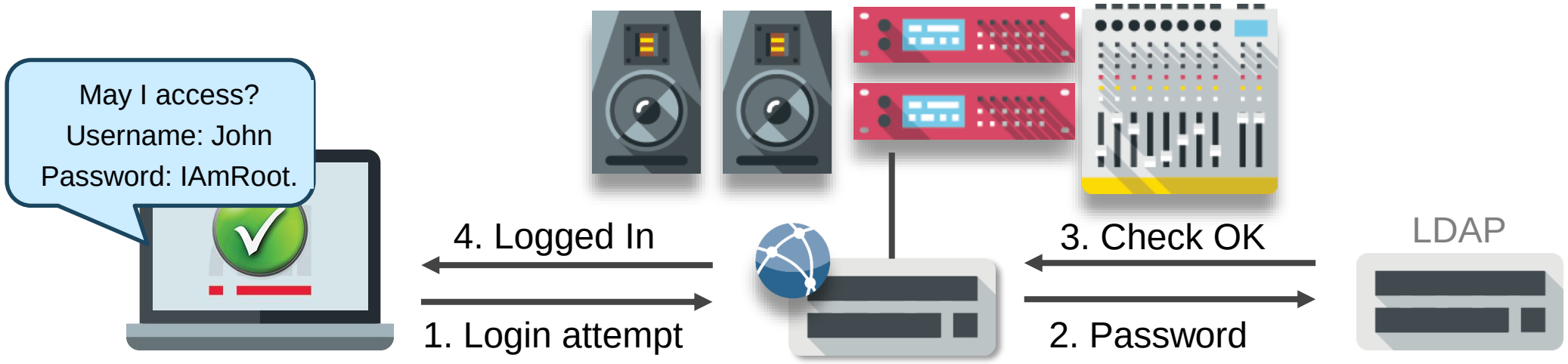
- Zones enable subnets in a domain to be independently clocked by an external clock sources (Example: GPS)
- Zoned domains do not have a requirement for unicast clocking to be enable between zones
- Zones can be clocked independently by a shared non-local clock source
  - This enables audio in geographically separated zones to be fully synchronized



Authentication: *LDAP*

What is LDAP?

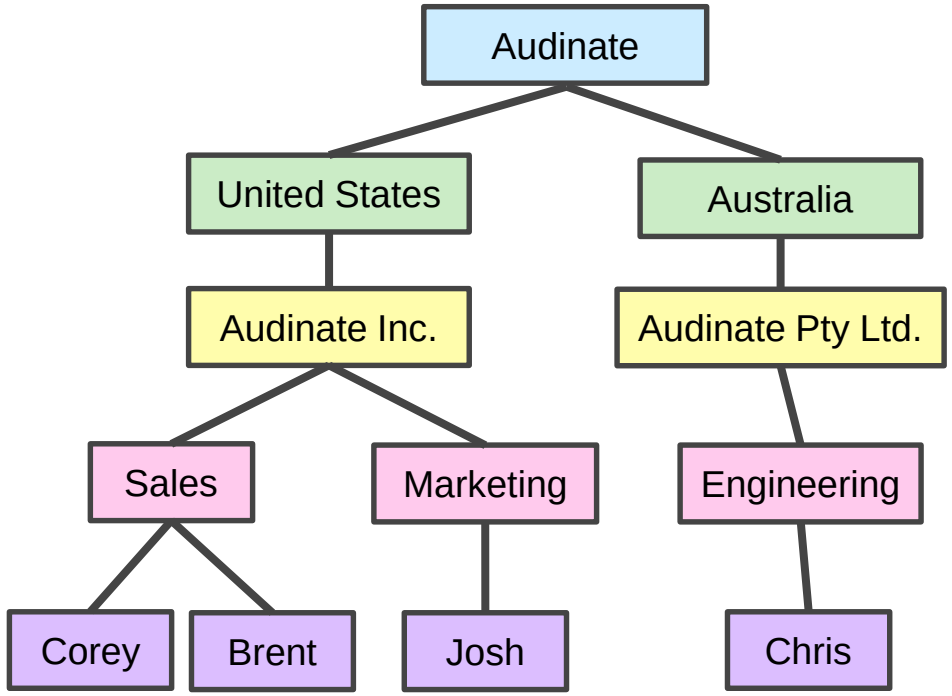
- LDAP (Lightweight Directory Access Protocol) is a software protocol for enabling anyone to locate organizations, individuals, and other resources such as files and devices in a network.
- LDAP is commonly used to provide a central place to store user names and passwords allowing many different applications and services to connect to the LDAP server to validate users.



LDAP Directory Organization

An LDAP directory is organized in a simple "tree" hierarchy consisting of the following levels:

- The **root** directory (the starting place or the source of the tree)
- **Countries**
- **Organizations**
- **Organizational units** (divisions, departments, and so forth)
- **Individuals** (which includes people, files, and shared resources such as printers)



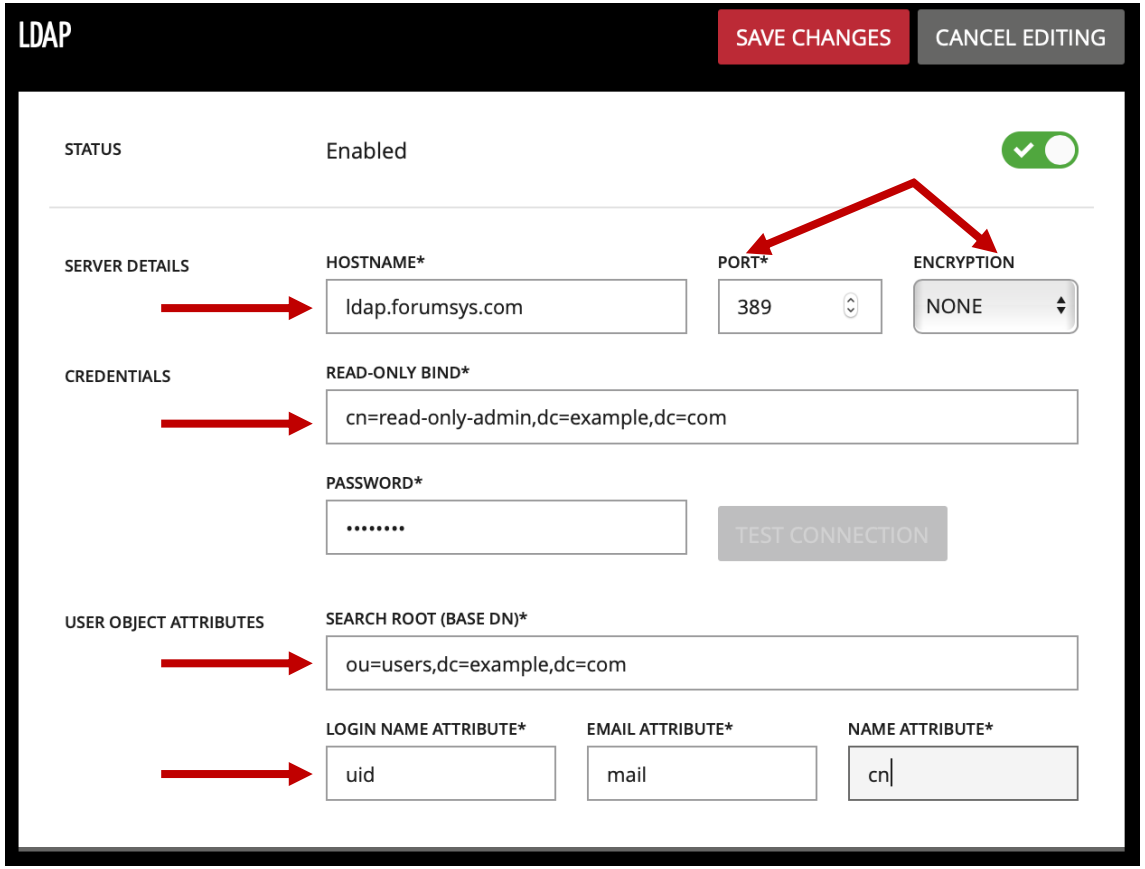
LDAP vs. Active Directory

- Active Directory (AD) is a Microsoft product that consists of several services that run on Windows Server to manage permissions and access to networked resources.
  - Contains information about every user account on the entire network
  - Treats each user account as an object
  - Each user object has multiple attributes (i.e. first name, last name, email address, phone number)
- LDAP is the protocol that Exchange Server uses to extract the data from the AD database in a usable format.
  - LDAP uses a relatively simple, string-based query to extract information from Active Directory.

Connecting to an LDAP Server

- To connect to an LDAP server go to ***Settings/External Services***

- The LDAP account connected must have sufficient permissions to search the LDAP database and read all relevant user records – write access is not required



Dashboard 1

Domains

Devices

Users

Roles

LDAP Groups

Settings

Audit Log

Search

Operators

AV Manager

Faculty

IT Staff

ADD GROUP

DELETE GROUP

Details

NAME* IT Staff

LDAP QUERY* (uid=euler)

TEST QUERY

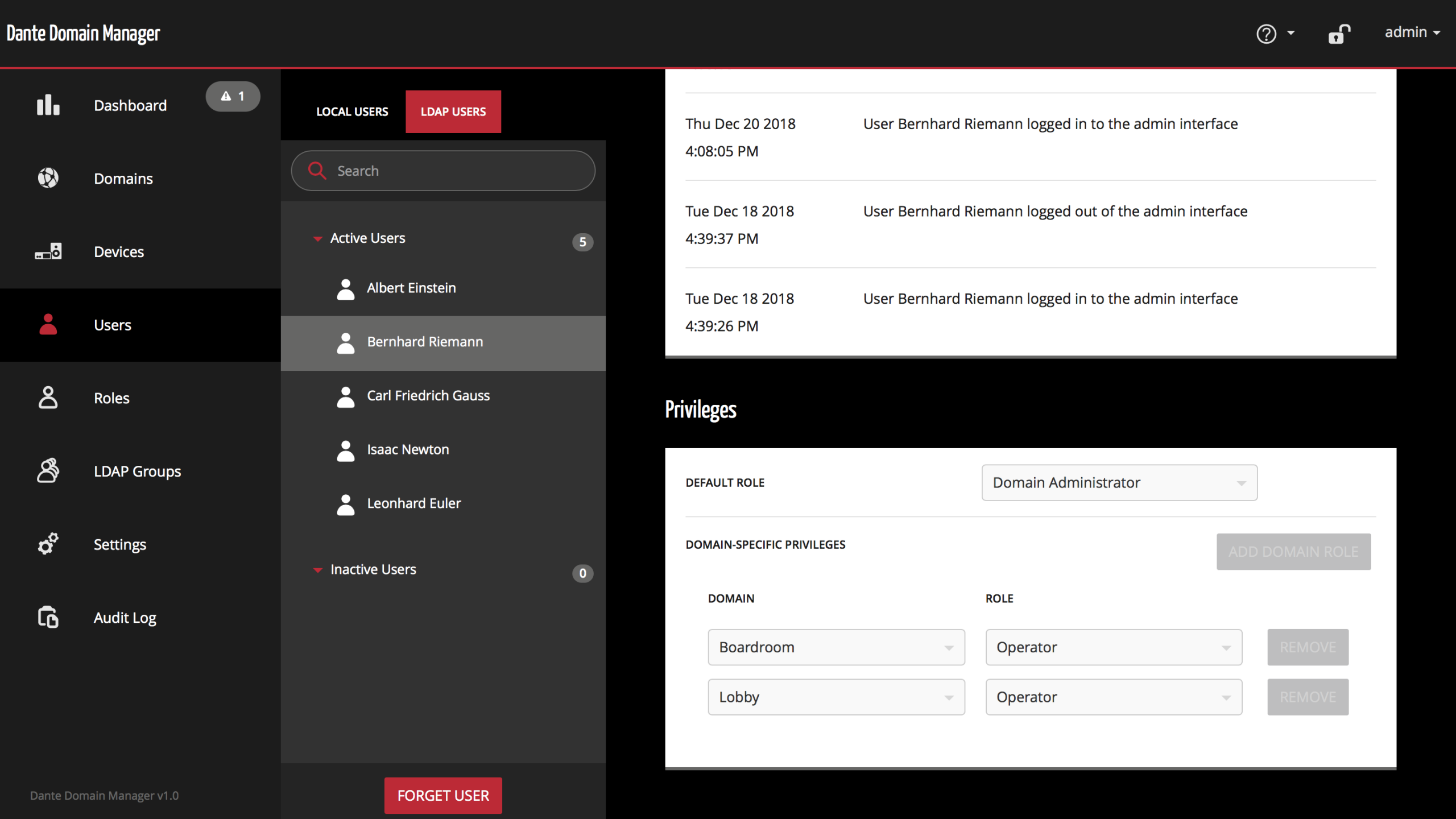
Privileges

DEFAULT ROLE Domain Administrator

DOMAIN-SPECIFIC PRIVILEGES

ADD DOMAIN ROLE

DOMAIN	ROLE	
ProductionStudio	None	REMOVE
Auditorium	Guest	REMOVE


Dante Domain Manager
admin
Dashboard
1
Domains
Devices
Users
Roles
LDAP Groups
Settings
Audit Log
Dante Domain Manager v1.0
LOCAL USERS
LDAP USERS
Search
Active Users
5
Albert Einstein
Bernhard Riemann
Carl Friedrich Gauss
Isaac Newton
Leonhard Euler
Inactive Users
0
FORGET USER
Thu Dec 20 2018
4:08:05 PM
User Bernhard Riemann logged in to the admin interface
Tue Dec 18 2018
4:39:37 PM
User Bernhard Riemann logged out of the admin interface
Tue Dec 18 2018
4:39:26 PM
User Bernhard Riemann logged in to the admin interface
Privileges
DEFAULT ROLE
Domain Administrator
DOMAIN-SPECIFIC PRIVILEGES
ADD DOMAIN ROLE
DOMAIN
ROLE
Boardroom
Operator
REMOVE
Lobby
Operator
REMOVE

Monitoring: *SNMP*

What is SNMP?

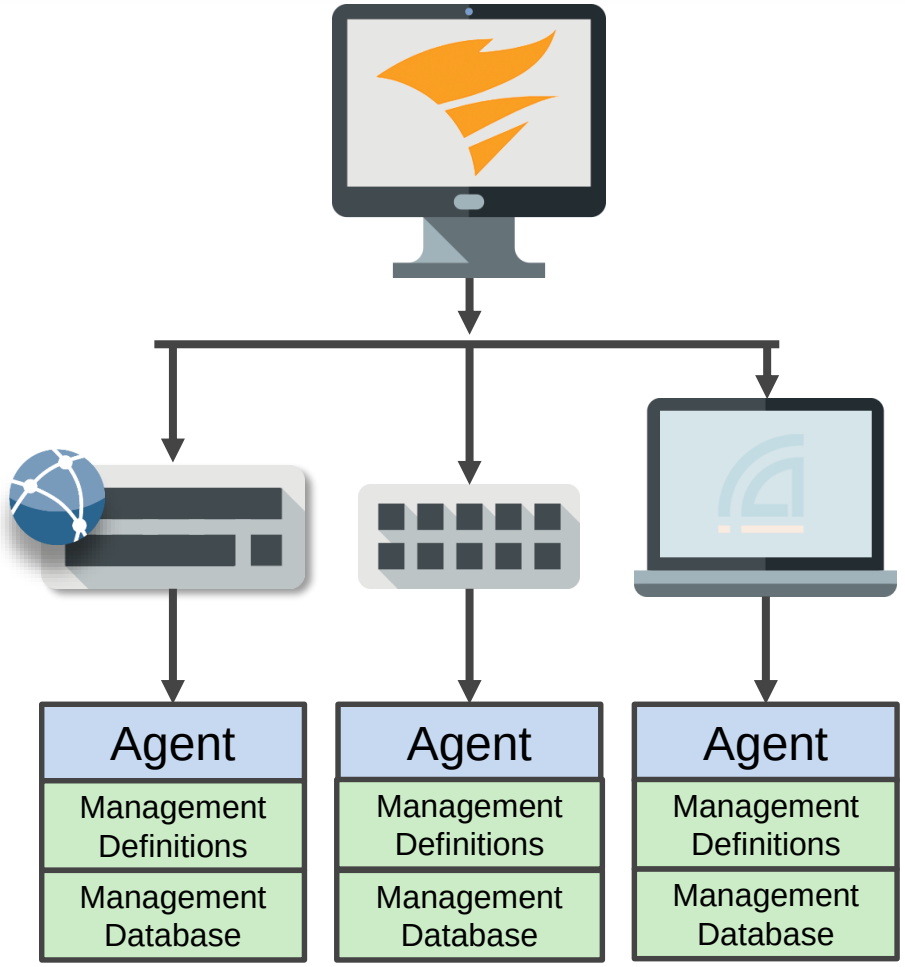
- Simple Network Management Protocol (SNMP) is a widely accepted protocol used to manage and monitor network elements.

- Allows multiple network enabled devices to be monitored from a “single pane of glass.”

- SNMP is implemented on a wide range of hardware including network devices such as switches, bridges, routers, gateways, servers and also on endpoint equipment such as printers and computers.

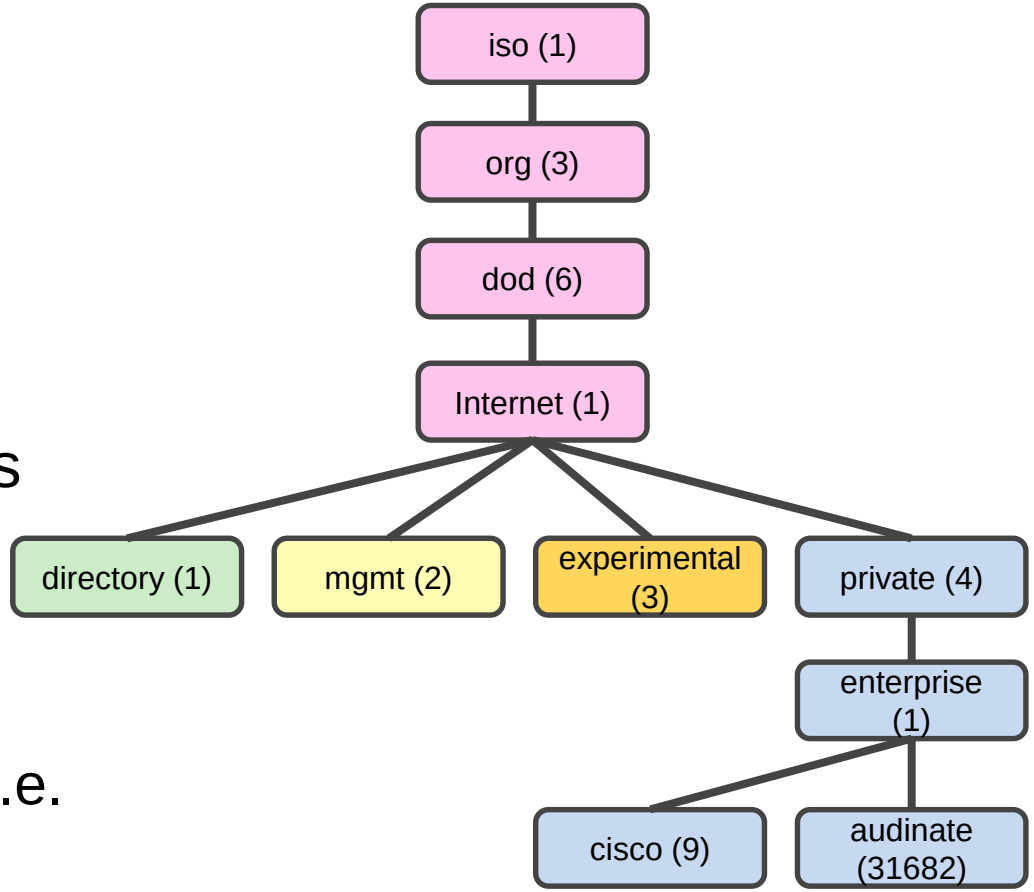
SNMP Basic Components

- **SNMP Manager:** Typically a computer or server that is used to run one or more network management systems. Queries and receives responses from the agents.
- **Managed Devices:** A managed device or network element that requires some form of monitoring and management. e.g. Routers, Switches, Servers, etc.
- **SNMP Agent:** A program packaged within a managed device that allows it to collect information from the device locally and makes it available to the SNMP manager when queried for.



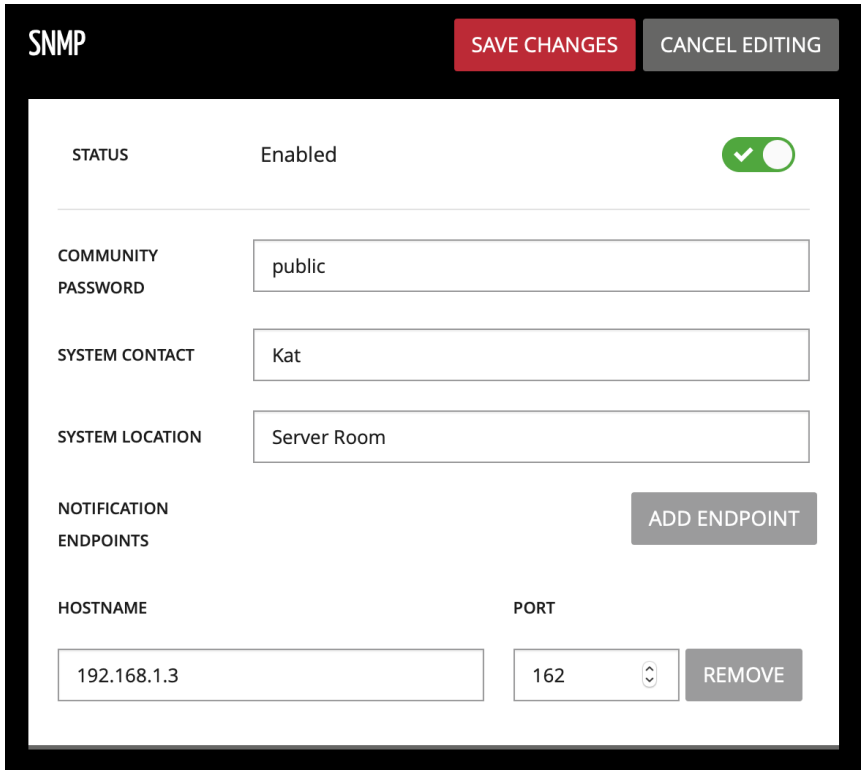
The Management Information Database (MIB)

- Every SNMP agent maintains an information database describing the managed device parameters.
- MIB files are the set of questions that a SNMP Manager can ask the agent.
- The MIB is mapped in a hierarchy expressed as an address system.
  - Each address is called an object ID or (OID)
  - Addresses rely on inheritance, i.e. root is 1 an nodes beneath will also include 1 in their label i.e. 1.1, 1.2, 1.3 and so on.
  - Standard address for internet resources is 1.3.6.1



DDM's SNMP INTEGRATION

- Set up on the ***Settings/External Services*** page
- When enabled, DDM becomes a read-only SNMP agent.
- The MIB *(available from the Support Portal)* can be polled by the external SNMP management system to identify the specifics of the change. This could trigger alarms or other actions
- Status information available in the DDM MIB includes:
  - Core DDM functionality
  - Licensing
  - External services
  - Domains and devices
- DDM supports SNMPv2c



DDM

Last 6 hours Refresh every 5s

Domain Name	Enrolled Devices	Offline Devices	Latency Errors	Clocking Errors	Subscription Errors
Auditorium	0	0	0	0	0
Background Music	3.00	0	0	0	0
Broadcast Studio	0	0	0	0	0
Meeting Rooms	5.00	1.00	0	0	0

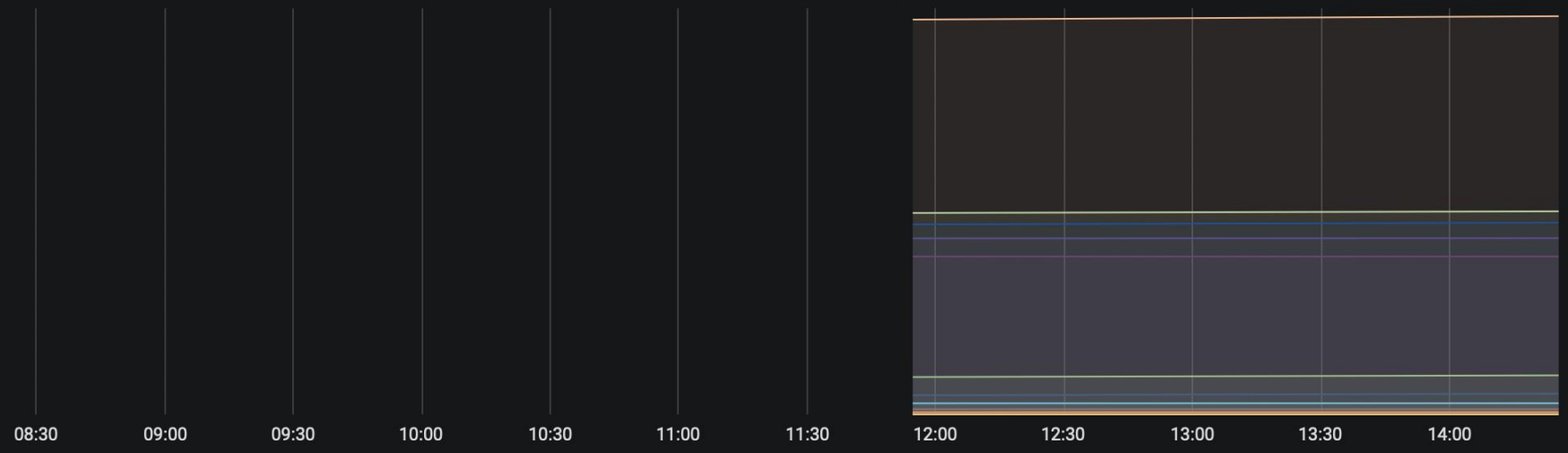
Discovery Service Status

Running

Device Manager Status

Running

Multicast Bandwidth Usage



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Questions?

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Kathryn Taub
Technical Sales Engineer
kathryn.taub@audinate.com