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Display multicast technology over IP based on Ethernet and Wi-Fi:

Different ways, different criteria.

WHITEPAPER

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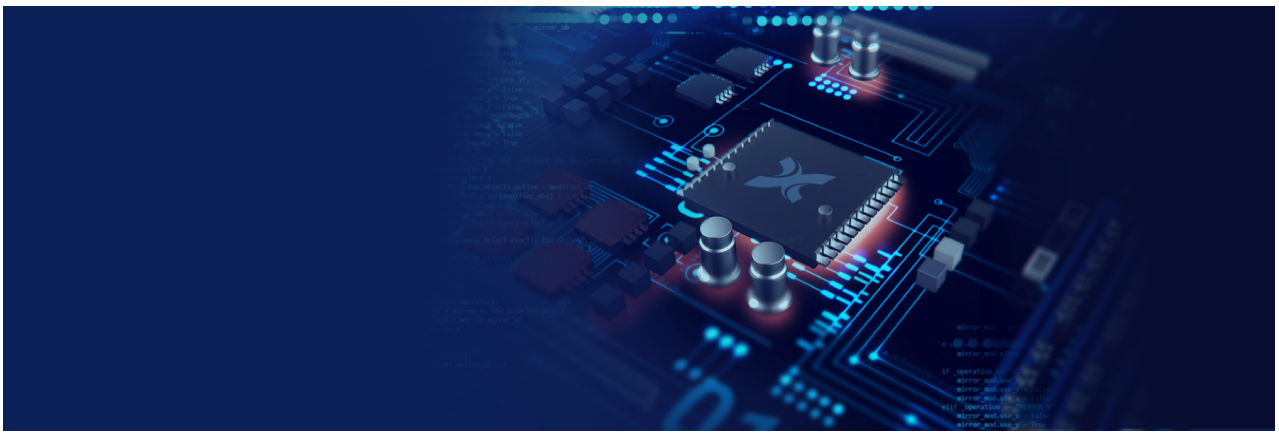
Introduction



Multicast: IP multicasting is a broadcast method that is utilized in certain Ethernet switches that allows a subscribed group of encoders to receive multicast data.

Multicast and broadcast traffics are common in our everyday network environments. Various kinds of services take advantage of multicast and broadcast for sending notifications, resource discovery, and distributed simulation (war gaming), e.g. Bonjour, MDNS, ...etc.

In this article, we will give you a brief introduction on what types of network transmissions are suitable for different wireless and wired network scenarios, to achieve the goal of sending large video/audio data from one transmitter to multiple receivers, to further decode and display. Furthermore, this can be extended to multiple transmitters and multiple receivers applications. For 1080P H.264 encoded video, in general, the amount of data being transferred may vary from a few hundreds kilobytes to several megabytes. In order to achieve data reliability and reasonable network bandwidth comsuption, we have many choices to achieve our “multicast” goal, but is there a most suitable approach?

TCP Multicast over Wi-Fi

In a wireless environment, all devices that operate on the same channel may interfere with each other, thus, data collisions can happen. Moreover, devices on the same channel also share bandwidth with each other, this is very different from Ethernet, where each device has its own private cable for data transmission to/from through routers.

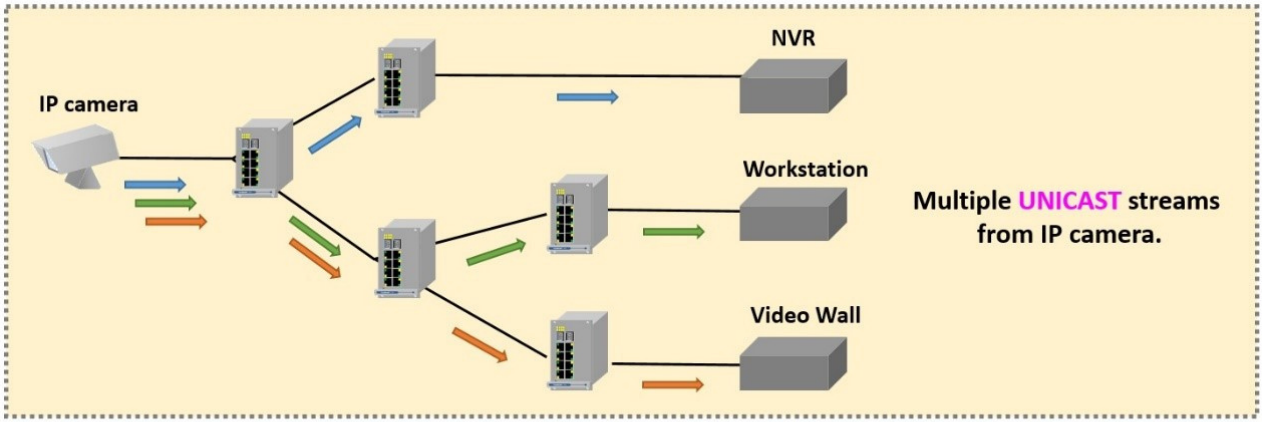


Fig. 1. Multiple unicast. [1]

Other than above, UDP multicast/broadcast data operates differently than unicast data on Wi-Fi. To assure every device receives the multicast/broadcast traffic, the AP must send the data in legacy data rate, which is 802.11abg data rate, which is much slower compared to 802.11n and 802.11ac.

For H.264 video data, when data loss occurs, image recovery from broken data may be an important issue. (Based on the encoding parameters you choose.) According to this predefinition.

of wireless environment, TCP protocol might be a decent choice to deal with data retransmission without much pain. To release multicast over TCP protocol, the data is unicast to each receiver from a single sender, which is actually multiple “unicast” transmissions.

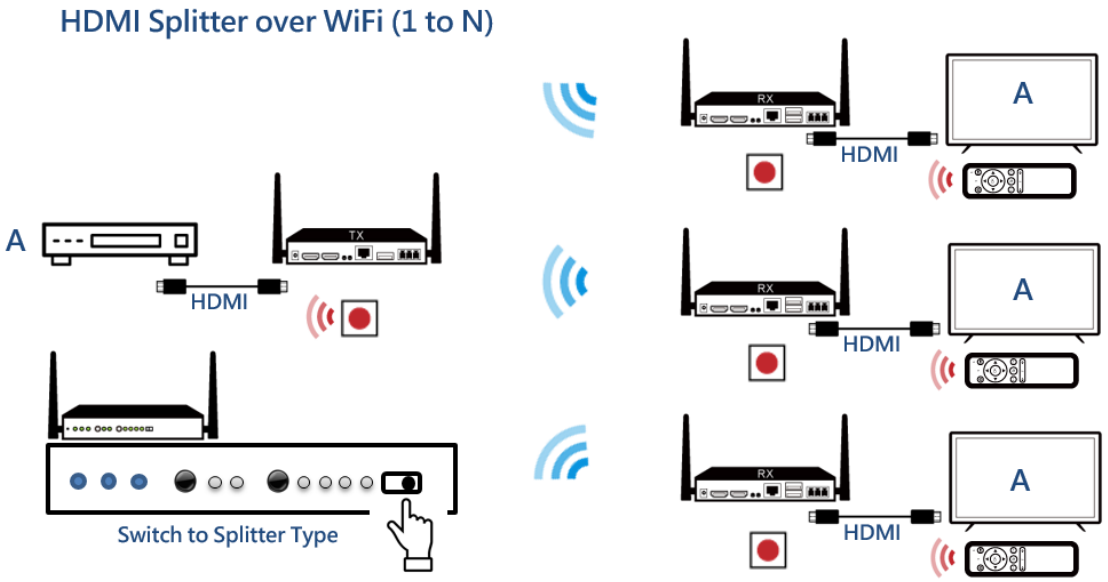


Fig. 2. TCP Multicast over Wi-Fi

There is also a downside of using TCP, each unicast transmission consumes part of bandwidth and do not share it with each other. So the amount of receivers that one transmitter can accommodate will depends on the Wi-Fi protocols (bandwidth) being used.

UDP Multicast over Ethernet

Broadcast is a simple way to release data that is being delivered to multiple devices on the network, but it will flood the traffic. Since Ethernet has higher bandwidth and data loss is less likely to happen than wireless networks. For switches that support IGMP snooping, we can do this without flooding the network of other irrelevant receiver devices.

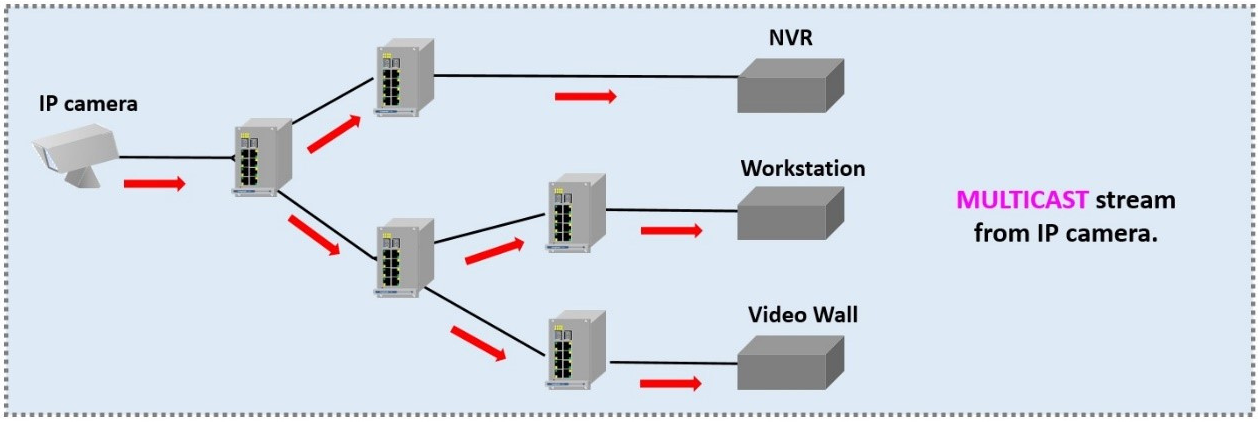


Fig. 3. Multicast. [1]

The set of messages that enable devices to send IP Multicast data to each other are called IGMP. IGMP stands for Internet Group Management Protocol. These protocols allow devices in the network to add or remove themselves from groups, each group having a special group address, usually it's from 224.0.0.0 through 239.255.255.255. Once a group is established, any member of the group can send data to the special group address and the Multicast Enabled Switches and Routers in the network will know where all the other members of the group are and correctly copy the data only to other group members.

In this way, we can multicast video and audio data from a single transmitter to hundreds of multicast recevier devices, without consuming extra bandwidth.

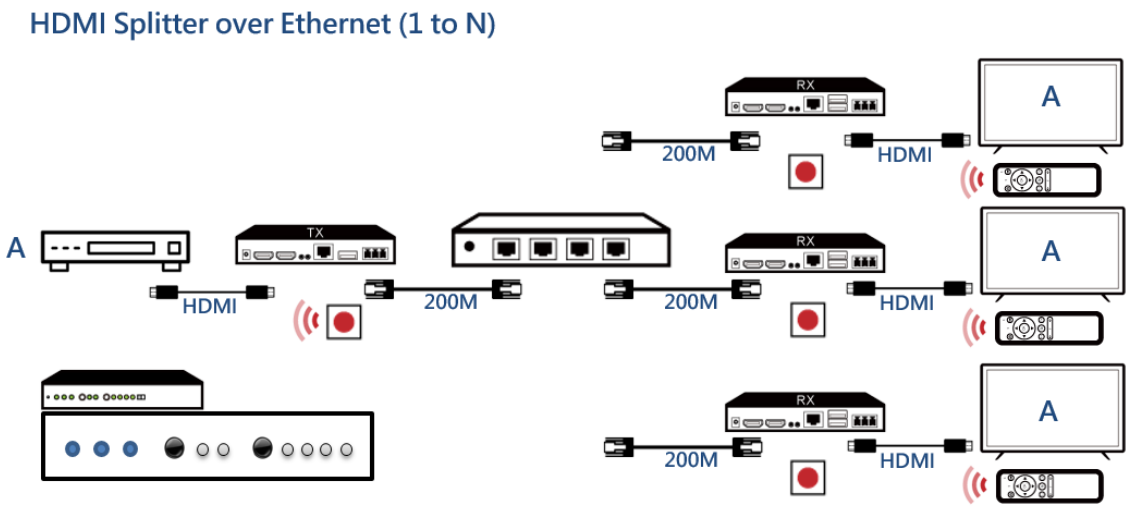


Fig. 4. 1 to N multicast

With multicast group, we can build up an M to N multicast scenario without traffic interference between each group.

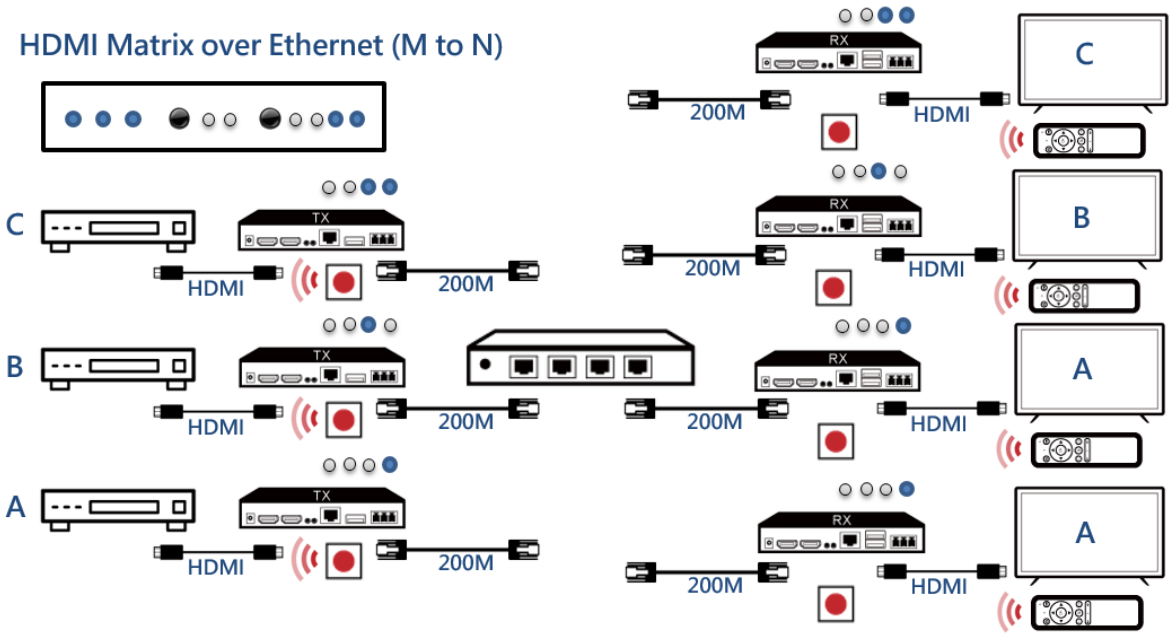


Fig. 5. M to N multicast

The Best Solution to Multicast

EZCast ProAV offers scalable and flexible Audio/ video extending solutions through Ethernet or Wi-Fi environment.

Extremely cost-saving design for devices, backbones and deployments

Simplified and unified transmitter and receiver design, economic LAN backbone of Fast Ethernet and easy deployment configurations make EZCast ProAV cost less than one-tenth when compared to traditional ProAV equipments.

Flexible modular design for various ProAV applications

Display extender, splitter, switcher, and matrix can be implemented by the combination of only one model of transmitters and receivers depending on different configurations.

Support Ethernet and Wi-Fi combined application

The latest EZCast Pro AV solution with cable and Wi-Fi connections is combined to make the application of no boundaries. Furthermore, this device is designed so you can "build your own solutions" with the pieces you need according to your needs. Wi-Fi connection is appropriate to utilize within buildings and across large facilities, which should be adopted as a compliment in some scenarios that cable connection is not suitable.

CMS makes remote controls and automation of operations possible.

Central Management System (CMS) console software on Windows/ macOS is provided for remote access and control of EZCast ProAV devices in the enterprise LAN, which is conceptually similar to the QuattroPod series powered by EZCast Pro technology.

References

1.**The Use Of Layer 3 Devices To Manage Multicast Data On Your CCTV Network**

(https://www.amgsystems.com/news-and-media/technical-bulletins/the-use-of-layer-3-devices-to-manage-multicast-data-on-your-cctv-network)

2. **Multicast and Real-Time Applications: IGMP, RSVP,RTP**
(http://www.cs.columbia.edu/~hgs/teaching/internet/mcast2.pdf)

3. **IETF RFC 988** (https://tools.ietf.org/html/rfc988)