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VLAN-based LAN Network Management Comparison using Cisco and Brocade

Rahmadhan Gatra
Department of Informatics, Graduate Program
Faculty of Science and Technology, UIN Sunan Kalijaga
Yogyakarta
rahmadhan.gatra@uin-suka.ac.id

Reolandi Akbar
Department of Informatics, Graduate Program
Faculty of Science and Technology, UIN Sunan Kalijaga
Yogyakarta
riolandiakbar@gmail.com

Bambang Sugiantoro
Department of Informatics, Graduate Program
Faculty of Science and Technology, UIN Sunan Kalijaga
Yogyakarta
bambang.sugiantoro@uin-suka.ac.id

Naufal Asyhab
Department of Informatics, Faculty of Science and Technology
UIN Sunan Kalijaga
Yogyakarta
naufalasyhab@gmail.com

***Abstract*— The need for security and convenience in carrying out data requires all users to be able to create a safer network, in terms of both data communication and sharing internet connection lines. The effectiveness of performance in work is always required to be able to work quickly and on time without the constraints of high data traffic that may cause problems in network devices. Those problems may ultimately cause all work to be hampered in its completion. Management of VLANs in a LAN connection is able to parse problems especially in terms of data communication and logical data transmission. This paper studies on this issue.**

Keywords-LAN; VLAN; Network

I. INTRODUCTION

The need for communication, resource sharing requires the establishment of a computer network that can connect devices such as computers, printers and various other devices to communicate between computer users and shared resources. One type of application of computer networks is the *Local Area Network* (LAN).

This need will definitely make data traffic even higher that if it is not managed properly it will cause other connections to be disrupted. Therefore, it is necessary to have a management of data traffic.

Virtual LAN is originated from limitations that LANs have [1]. (VLAN) By using VLAN technology in managing the distribution and regulation of data traffic, a management switch can group interfaces (ports) into several groups according to the desired network requirements. This will break down the density if there is one medium interface. Furthermore, in high traffic, the other interfaces will have no effect. VLANs can perform this management and this can be found in the Ethernet headers [2].

II. THEORITICAL BASIS

A. What is Cisco and Brocade

Cisco system is the first company to issue a router that supports many commercial network protocols. The network protocol was later developed into several new protocols, which later became known as Cisco proprietary network protocols. Some of them are Cisco Discovery Protocol (CDP), Enhanced Interior Gateway Routing Protocol (EIGRP), and VLAN Trunking Protocol [3].

Brocade is a network device manufacturer that is quite well known in Indonesia. Headquartered in San Jose, California, a company that has approximately 4000 people with its worldwide product service makes Brocade a tough competitor of Cisco. In 2008, Brocade acquired Foundry Networks, a maker and service provider of high-end Ethernet switches and routers for enterprise users. Now Brocade is a leader in upstream-downstream network solutions that help today's organizations loaded with data to optimize connectivity and maximize business value from data [4].

Both of the above devices have their respective strengths and advantages so that in terms of seizing market share in the network it is very high. In this case, Cisco devices are indeed a device that is still a mecca in the world of learning both from High School up to the world of Higher Education. On the other hand, Brocade devices also begin to build their own patterns of thinking in terms of configuration and network management.

B. Differences between Cisco and Brocade

Cisco and Brocade are both devices that are concerned with network management, but both have certain differences. One of the differences is entering configuration commands. Configuring Brocade devices adopts reversing configuration scenarios of scenarios of Cisco devices. Therefore, a network admin who is accustomed to using Cisco and just starting configuration with Brocade will have a little difficulty in doing the configuration. Table I gives some comparison information between Cisco and Brocade devices.

TABLE 1. COMPARISON BETWEEN CISCO AND BROCADE ACCESS MANAGEMENT

ACCESS TYPE	CISCO	BROCADE
Console Port	DB9-to-RJ45 Rollover Cable	DB9-to-RJ45 Straight-Trough Cable
Password	No Default Password	No Default Password
Telnet Server	Must Configure VTY	Enabled by Default
HTTP Server	Platform Specific	Enabled by Default
SSH v2	Disabled by Default	Disabled by Default
SNMP (RO)	Platform Specific	Enabled by Default (Public)
SNMP (RW)	Disabled by Default	Disabled by Default
Default Enabled Password	None	None
Telnet Password	Requires VTY and Enable Password	None By Default
Password Encryption	Disabled by Default	Enabled by Default
Level of CLI Access	Multiple levels of Access; Platform Specific	Three Levels (Super-User, Port-Config and Read Only)
Access Security	Separate VTY, Auxiliary, Console Lines and HTTP Server in Config	Can Specify Management IPs for Telnet, HTTP and SNMP Server Access
ACLs for Access Security	Uses access-class with ACL for VTY and HTTP	Uses Access-group with ACL for Telnet and HTTP
AAA	Supported, Off by Default	Supported, Off by Default

III. RESEARCH METHOD

From Figure 1, we can actually do a VLAN management that divide up Virtual-based network segmentation in a Local Area Network either in one large capacity room with several network devices or in one building that connect with several rooms in several other buildings. This VLAN management can be done on several Switch and Router network devices with Manageable type devices or logically managed devices. In this case, there will be a little comparison of feature devices in performing VLAN configuration management using Cisco and Brocade.

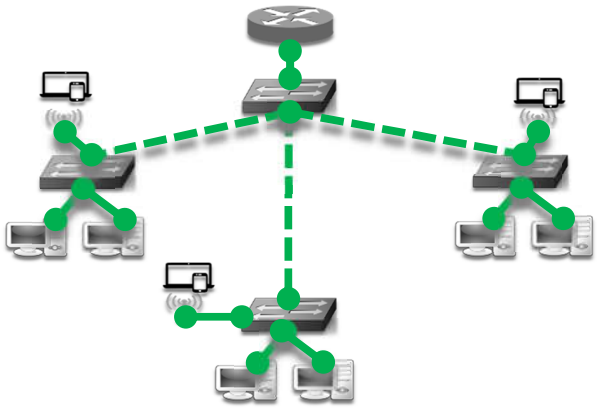

Figure 1. Network topology

TABLE II. DIFFERENCE FEATURES BETWEEN CISCO AND BROCADE

FEATURE	CISCO	BROCADE
Default VLAN	VLAN 1 – All Port are Numbers by Default	VLAN 1 – All Port are Numbers by Default
VLAN Database	Separate database for VLAN Configuration Info (vlan.dat)	N/A
Management IP Address	Configured on any VLAN; Only Accessible form Assigned VLAN	Cnfigured Globally on L2 Switch; Accessible form all VLANs
Port/VLAN Assignments	VLANs are Assigned to Ports	Ports are Assigned to VLANs
802.1Q Tagged Ports (Trunks)	All VLANs Assigned to Trunks by Default (can be pruned)	No VLANs Assigned to Tagged Port by Default
Dual Mode	Supported – Must be Manually Configured (Native VLAN)	Supported – Must be Manually Configured
Interface type (VLAN Routing)	VLAN interface; Created when VLAN is configured	Router-Interface; Created Under the VLAN, Configured Under ve Interface

Table II provides difference of features between Cisco and Brocade. Figure 2 [5] provides sample configuration presented between Cisco and Brocade in adding VLAN configurations with Access Mode, as follows:

CISCO
CISCO# configuration terminal CISCO (config)# vlan100 CISCO (config-vlan)# interface GigabitEthernet 1/1/1 CISCO (config-vlan)#switchport mode access CISCO (config-vlan)#switchport access vlan 100 CISCO (config-vlan)# interface GigabitEthernet 1/1/2 CISCO (config-vlan)#switchport mode access CISCO (config-vlan)#switchport access vlan 100 CISCO (config-vlan)#^Z CISCO#write
BROCADE
BRCD# configuration Terminal BRCD (config)# vlan 100 BRCD (config-vlan-100)# untagged ethernet 1/1/1 to 1/1/2 BRCD (config-vlan-100)#^Z BRCD#write memory

Figure 2. Comparison of vlan configuration using access mode between cisco and brocade

From this configuration, you can see the difference in entering the command line in Cisco, which is longer than the command line in Brocade. Namely on Brocade devices simply by writing untagged which means Access mode on Cisco. That is another difference in configuring VLAN on Brocade and Cisco devices. On Cisco, creating VLANs is on a physical interface, but in Brocade, it is on the physical device.

Figure 3 provides configuration for the creation of native VLAN Trunking on Cisco and Brocade devices. Native VLAN is a VLAN that is usually used in communication for network management between manageable Switch devices. For Brocade devices, simply write the "dual-mode <nomor_VLAN>" command line, so we can create a native VLAN.

It is also important to create a pathway (Fig. 4) to be able to distribute certain VLANs that are permitted by network administrators on building devices connected to other buildings. In the configuration on Cisco devices, it is by writing the "Switchport trunk allowed VLAN <number VLAN Allowed>" command line, while the Brocade device it is by writing the VLAN first and adding the command line "tagged ethernet <number_Interface_from_first> to <number_Interface_first_>.

CISCO
CISCO# configuration terminal CISCO (config)#vlan 100 CISCO (config-vlan)#vlan 200 CISCO (config-vlan)#interface GigabitEthernet 1/1/1 CISCO (config-if)#switchport trunk encapsulation dot1q CISCO (config-if)#switchport mode trunk CISCO (config-if)#switchport trunk native vlan 100 CISCO (config-if)#^Z CISCO#write
BROCADE
BRCD# configuration Terminal BRCD (config)#vlan 100 BRCD (config-vlan-100)#tagged ethernet 1/1/1 BRCD (config-vlan-100)#vlan 200 BRCD (config-vlan-200)#tagged ehternet 1/1/1 BRCD (config-vlan-200)#interface ethernet 1/1/1 BRCD (config-vlan-200)#dual-mode 100 BRCD (config-vlan-100)#^Z BRCD#write memory

Figure 3. Comparison of VLAN Trunking Configuration process between Cisco and Brocade

CISCO
CISCO# configuration terminal CISCO (config)#vlan 100 CISCO (config-vlan)#interface GigabitEthernet 1/1/1 CISCO (config-if)#switchport trunk encapsulation dot1q CISCO (config-if)#switchport trunk allowed vlan 100 CISCO (config-if)#switchport mode trunk CISCO (config-if)#exit CISCO (config)#interface GigabitEthernet 1/1/2 CISCO (config-if)#switchport trunk encapsulation dot1q CISCO (config-if)#switchport trunk allowed vlan 100 CISCO (config-if)#switchport mode trunk CISCO (config-if)#^Z CISCO#write
BROCADE
BRCD# configuration Terminal BRCD (config)#vlan 100 BRCD (config-vlan-100)#tagged ethernet 1/1/1 to 1/1/2 BRCD (config-vlan-100)#^Z BRCD#write memory

Figure 4. Create a pathway

Examples of configurations for adding VLAN databases and VLAN IP Addresses to Cisco and Brocade are as follows:

CISCO
CISCO# configuration terminal CISCO (config)#vlan 100 CISCO (config-vlan)#interface GigabitEthernet 1/1/1 CISCO (config-if)#switchport trunk encapsulation dot1q CISCO (config-if)#switchport trunk allowed vlan 100 CISCO (config-if)#switchport mode trunk CISCO (config-if)#exit CISCO (config)#interface GigabitEthernet 1/1/2 CISCO (config-if)#switchport trunk encapsulation dot1q CISCO (config-if)#switchport trunk allowed vlan 100 CISCO (config-if)#switchport mode trunk CISCO (config-if)#^Z CISCO#write
BROCADE
BRCD# configuration Terminal BRCD (config)#vlan 100 BRCD (config-vlan-100)#tagged ethernet 1/1/1 to 1/1/2 BRCD (config-vlan-100)#^Z BRCD#write memory

Figure 5. Adding VLAN databases and IP addresses to Cisco and Brocade

IV. CONCLUSION

The working principle of a LAN is that all devices that are on a LAN are in one broadcast domain. A broadcast domain includes all devices connected to a LAN and if one device sends a broadcast frame then all other devices will receive coffee from that frame. Without a VLAN, a switch will assume that all interfaces (ports) are in a broadcast domain. In other words, all computers connected to that switch will be considered to be on the same LAN. Using VLAN technology, switches can group several switch interfaces into one broadcast domain and several other interfaces into different broadcast domains, creating multiple broadcast domains. Each broadcast domain created by a switch is what we call a VLAN.

VLAN management can use various manageable switch and router network devices from several vendors, in this case we use Cisco and Brocade. The concept in terms of VLAN management on both devices is very unique where on Cisco devices we are always invited to think if VLAN management is always done on the physical interface side. However, on the Brocade device the concept is returned so that we who are not accustomed to using this tool will be invited to think again to do configuration management.

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