GEMINI STUDIOS: A GAME DEVELOPMENT COMPANY

A Project Proposal

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NETWORKING II

BY

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CHAPTER I

INTRODUCTION

A vital aspect of human existence has always been entertainment. As stated by Pipaliya (2022), games like Minesweeper, Solitaire, and Skyroads became very popular when Windows 98 was highly adored. Among video games, Super Mario emerged as a fan favorite. Although mobile gaming came into play much later, it introduced iconic titles such as Snake on Nokia devices in 1997. However, these early games were straightforward, marked by minimalistic design, basic graphics, limited effects, blocky elements, polygonal characters, slow-paced gameplay, and frequent performance lags.

As modern technology advances and creative ideas emerge, the game development community explores and expands genres and methods. Modern games are created using a more flexible approach, intertwined with reality through Virtual Reality (VR). Gemini Studios, a new game development company, will revolutionize the gaming world by developing narrative experiences that combine innovative elements of gameplay with highly innovative technology. This start-up company has already expanded into three branches, with the main three-story situated in IT Park, Lahug, Cebu, the second in The Manila Times Building 2310 Taft Avenue, Malate, Manila, and the third in Davao Park District, Lanang, Davao. The main branch in Cebu consists of eight departments in total: the Reception, Human Resources Department, IT Department & Server Room, Graphic & Audio Design Department, Sales Department, Marketing Department, Game Development Department, and Leisure Room. The second branch is composed of three departments, namely, the Reception, Quality Assurance, and IT Department. Lastly, the third branch encompasses the Reception, Customer Support, and an IT Department.

Gemini Studios will officially open its offices in June 2025. After thoroughly conducting a full inspection of the three branches, the researchers, propose a network system that is feasible for this kind of setup.

CHAPTER II

REVIEW OF RELATED LITERATURE

This chapter delves into the literature on the historical evolution of gaming, the incorporation of advanced technologies in game development, and the organizational frameworks that back the gaming industry. It explores how blending imaginative storytelling with cutting-edge technology has enhanced the development of a more captivating and interactive gaming experience. Additionally, the section explores the obstacles and possibilities encountered by contemporary game development firms, with an emphasis on their operational structures and infrastructure needs, especially in the realm of creating multi-location businesses.

2.1 Evolution of Gaming Technologies

The gaming industry has evolved over the years, with big leaps of advancement each time. Based on a study conducted by Singh et. al (2024), Although early video game prototypes were created in laboratories in the 1960s, Atari's 1972 release of Pong was the turning point. It aided in the industry's inception. The table tennis game in the arcade was popular and attracted customers keen to participate and businesses that began creating their imitations. Similarly, in 1975, Atari released a version of Pong for home consoles, and in 1977, it released its own Atari 2600 home console would sell over a million units, making it the first console to do so. Arcades were already producing revenue by 1982. More money than the box office and the pop music industry combined.

However, from 1985 to the 2000s, the gaming industry expanded too fast to sustain itself. Atari licensed incredibly expensive ports of Pac-Man and an E.T. game adaptation in an attempt to take advantage of the expanding home console market. the extraterrestrial realm. They were released in subpar condition, hurried to market, and cost the corporation millions in returns and more in harm to its reputation. Numerous additional subpar attempts at games and

consoles led to a collapse in the sector as other businesses sought to take advantage of the market. At the same time, with the 1982 arrival of the Commodore 64, personal computers were starting to take over the gaming industry.

Finally, from 2001 up to the present, the gaming industry's revenue expanded from tens of billions to hundreds of billions due to the advent of the internet and mobile devices. The Xbox Live online gaming platform, which Microsoft introduced in 2001 and offered gamers voice chat and multiplayer matchmaking for a monthly subscription charge, swiftly became a consumer necessity. In the meantime, Blizzard was using the Massive Multiplayer on PCs. With the launch of World of Warcraft in 2004, the online (MMO) subscription market reached a peak of over 14 million monthly paying members. However, the shift of gaming to a mobile platform was cemented by Apple's iPhone. The company's launch of the App Store for its smartphones, which was shortly followed by Google's store for Android devices, opened the door for app developers to produce mass-market games that were free, paid, and pay-per-feature.

The impact of this evolution includes social dynamics and representation and cultural and political influence, as highlighted in the volume *Examining the Evolution of Gaming and Its Impact on Social, Cultural, and Political Perspectives* edited by Valentine & Jensen (2016) from the book series *Advances in Human and Social Aspects of Technology*. With ethnically and LGBTQ+ inclusive characters, as well as strong, independent female protagonists like Lara Croft and Aloy, modern video games have grown to feature authentic and diverse depictions. This change represents a departure from conventional prejudices and a trend toward equality and diversity as society values. Culturally and politically, contemporary games address societal concerns such as power dynamics, racial diversity, and gender norms, promoting cross-cultural communication and dispelling prejudices. Furthermore, by encouraging user participation through incentive systems, gamification has an impact on industries like education and fitness that go beyond entertainment.

Overall, the studies show how the gaming industry has changed from its primitive origins to the highly developed, narrative-driven, and culturally significant medium it is now. Contemporary games follow a trend of meaningful representation by integrating culture and politics. Gemini Studios is a prime example of the gaming industry's flexibility, utilizing innovative technology and diversity to impact entertainment and adopt trends such as gamification outside of gaming.

2.2 Contemporary Game Development Approaches

When it comes to design, the modern approach greatly differs from the beginning of game development. From the findings of Cormio et. al (2024) in the study *Exploring Game Design Approaches Through Conversations with Designers*, game designers appear to combine stability components with the necessity of flexibility throughout the design process, utilizing several ways to ensure the coexistence of such aspects. Additionally, many factors, such as time, budget, and market restrictions, are potential causes of change.

These results support the relationship between change-related elements, restrictions as obstacles, and chances to improve teamwork and creativity. The resources that designers use to uphold set frameworks while still adapting to changing circumstances fall under the category of balance. A key tactic to guarantee the process's coherence and flexibility was determined to be teamwork and communication. However, in regards to the necessity of testing and evaluating every design solution and avoiding tunnel vision effects, interviewees demonstrated that iteration is a vital pillar in game design. According to scientific literature, cooperation, information exchange, and iteration are essential components of successful and adaptable game design processes.

From the point of view of Querné (2023), there are Iterative Design, Rational Design, Top-Down Design, Bottom-Up Design, High-Level, Mid-Level, Low-Level Design, System Centric Design, Player Centric Design, Data-Driven Design, Data Informed Design, Additive

Design, and Susbstractive Design. The main drawbacks of this strategy are that many designers, particularly juniors and students, tend to undervalue the initial stage and concentrate solely on experimenting and testing, which leads to numerous problems that could have been resolved sooner. In addition, our instincts are often incorrect when we lack experience. The use of "tools and processes" that close the gap between the player and the game system is a component of rational game design. To change the difficulty of ingredients or game mechanics, use a difficulty matrix to determine the various skills and atomic factors that can be modified.

To determine the in-game incentives that influence players' behavior, use OCR loops. Map the various feedback and indications to increase clarity and usefulness. If done correctly, the majority of the "easy" problems will be resolved before the design is even put into practice. There are two methods for determining how to begin a design: Top-Down and Bottom-Up, either begin with the player's imagination or begin with the components and game mechanics. For all the systems to be consistent with one another, the goal is to ensure that everyone agrees. AI, 3C, metagames, and other specialized or feature-rich systems are the emphasis of mid-level design. The goal is to transform the high-level design into more specific terms while maintaining the same objectives and rules. Building an actionable design for a particular feature is the main goal of low-level design.

Because games are made for the players who interact with them, player-centric design is crucial to game development. Deep but unreachable interaction mechanics that don't connect can result from overemphasizing systems at the expense of the player's experience. Developers must make sure that features and systems are purposefully created to improve the player's trip rather than existing in a vacuum to prevent this. In addition, Data-Informed Design provides a well-rounded strategy by utilizing data to pinpoint problems and direct choices in a way that is consistent with the goals of the designer and the intended audience. Data-informed design uses data to help and improve the creative process, in contrast to Data-Driven Design, which puts data above creativity and may strive for unachievable perfection.

Additive and subtractive techniques are crucial instruments for gameplay optimization when it comes to design methodologies. To fill in depth or variety deficits, additive design entails adding new features as long as they work in unison with current systems. Subtractive Design, which focuses on simplifying features and eliminating redundancies to improve the main gameplay loop, is more successful when dealing with usability problems or excessively complicated mechanics. To guarantee a seamless and captivating experience, both strategies necessitate a thorough examination of qualitative and quantitative data from player-centric and system-centric viewpoints.

In conclusion, Iterative design, Player-Centric Design, and Data-Informed Design are examples of contemporary approaches that demonstrate a move toward adaptability, teamwork, and the smooth blending of player requirements with system requirements. Businesses like Gemini Studios are prime examples of this development, using cutting-edge technologies like virtual reality and structured design methodologies to produce captivating, story-driven video games. The future of game development is marked by this convergence of creativity, technology, and methodology, which places a strong emphasis on flexibility and innovation to satisfy changing player demands.

2.3 Organizational Structure in Tech Startups

The tradeoffs between creative and financial success as it investigate the argument between flat and hierarchical start-up architectures, according to Lee (2021). Though it runs the danger of poor execution, managerial overload, and power disputes among subordinates, a flatter structure encourages innovation by promoting ideation and collaboration. On the other hand, adding a few layers of hierarchy enhances coordination, direction, and financial viability—albeit possibly at the price of originality. This trade-off is supported by empirical data from game development start-ups, which indicates that while flat organizational structures could be effective for certain businesses, a balanced hierarchy can improve long-term survival and

commercial success. The study highlights the necessity of making structural decisions that are appropriate to the context and warns against the pervasive illusion of flat organizations.

While many businesses concentrate on creating ground-breaking technology and attracting capital, how they organize their teams and internal procedures can just as much impact the success rate of their business. As mentioned by Salina (2024) in an article, significant challenges that startups frequently encounter include unstructured growth, poor communication, ambiguous roles, delayed decision-making, and scaling difficulties. Without a clear plan, rapid expansion can lead to uncertainty, overwhelm executives with operational minutiae, weaken corporate culture, and lower the quality of the final product. Collaboration and productivity are further hampered by ineffective communication and unclear roles, which result in redundant work and stalled innovation. While growth necessitates constant organizational adaptation to manage resources and maintain quality, slow decision-making, frequently brought on by bureaucratic institutions, can impede agility and competitiveness. To ensure sustained growth and innovation, successful businesses overcome these obstacles by foreseeing future demands, clearly defining roles, maintaining culture, putting in place scalable systems, and encouraging agile decision-making.

These findings are consistent with the environment of game development start-ups such as Gemini Studios, where successful long-term growth depends on the interaction of cutting-edge technology, creative output, and efficient organizational structures. When taken as a whole, these observations offer a strong basis for comprehending how organizational methods affect the ever-changing creative sectors.

2.4 Implementation and Benefits of Voice Over Internet Protocol

By using internet infrastructure to send voice data, Voice over Internet Protocol (VoIP) technology provides a novel way to communicate. Because of its benefits, which include increased communication capabilities, flexibility, and cost-effectiveness. It is especially desirable

for businesses looking to simplify and consolidate their networks. VoIP systems do, however, present many difficulties, including network performance issues, security flaws, and quality of service problems. Important elements that might impair voice quality and compromise system dependability include latency, jitter, and packet loss, according to research. Furthermore, VoIP requires strong encryption and cutting-edge security measures because of its reliance on data networks, which exposes it to risks including malware, packet interception, and hacking (*Voice Over Internet Protocol (VoIP) Research Paper*, 2024).

According to Fasiku (2018), VoIP can be used for nearly any voice communications need, from basic inter-office talks to sophisticated multi-point teleconferences and shared screen settings. A suitable level of voice reproduction quality must be offered. Therefore, VoIP equipment needs to be adaptable enough to work in a variety of settings and configurations and be able to combine VoIP and traditional phone calls. The ideas underlying VoIP technology have been thoroughly examined, and it seems that the telecommunications sectors will undergo a significant transformation with the introduction of this technology.

The intricacy of incorporating VoIP systems into current network infrastructures continues to be a hurdle for numerous enterprises, despite its potential. Customized solutions that are suited to the unique requirements of a company are crucial, as evidenced by the need to strike a balance between security, quality of service, and cost-effectiveness. Technological developments like better codecs and encryption techniques keep addressing these problems piecemeal. Nevertheless, careful planning, infrastructure investment, and a calculated approach to risk mitigation and performance optimization are necessary for the successful deployment of VoIP. Businesses must prioritize network design and maintenance in order to fully utilize the advantages of VoIP until comprehensive solutions are created (*Voice Over Internet Protocol (VoIP) Research Paper,* 2024).

2.5 Networking Systems for Multi-Branch Companies

Different types of network systems are being implemented, depending on the area and needs of the organization. In a study written by Alt & Fleisch (2000), maintaining competitive advantage requires networkability, which is made possible in large part by business networking systems (BNS). The study emphasizes the significance of coordinating IT and business objectives by pointing out that traditional Interorganizational Systems (IOS) encountered major adoption hurdles. It also notes that a lot of businesses have made investments to improve their internal ERP systems, using inter-organizational modules to build a strong BNS. These systems go beyond the discrete methods frequently found in the literature to include supply chain management and electronic commerce. The paper provides insightful information on the strategic and tactical advantages of BNS integration by demonstrating three different forms of BNS through case studies and extracting four important lessons from their application.

Supporting this claim, Skulj et. al (2014) states that work systems that are connected in a network are more resilient to disturbances than a collection of disjointed work systems, according to a production experiment that takes the shape of a multiplayer game. Work systems can assist one another in a network of work systems, which is a cooperative and competitive production environment. The relationships between the work systems are dynamic and influenced by people's trust, fear, and opportunism.

The suggested network system for Gemini Studios' growing operations across several branches reflects the fundamentals of an efficient BNS. Gemini Studios hopes to improve its operational efficiency and facilitate creative game development processes by guaranteeing strong connectivity and integration across divisions including IT, Quality Assurance, and Game Development. Gemini Studios' network architecture makes sure that its technological infrastructure supports its mission of transforming the gaming industry through innovative and cooperative approaches, much like BNS aligns IT with strategic objectives. Therefore, the BNS

tenets offer a fundamental structure for contemporary businesses, particularly those in the creative sectors like video game production.

CHAPTER III

TECHNICAL BACKGROUND

This chapter explores the technical background necessary to comprehend the founding and workings of Gemini Studios. It provides the foundation for the suggested network system by outlining the technological factors, software, systems, and infrastructure needed to guarantee smooth performance, communication, and teamwork among different branches.

3.1 Google Docs

Google Docs is a free word processor, which enables its users to import, create, edit, and update online documents in various file formats and typefaces from any computer with an internet connection and a web browser. The foremost benefit of using Google Docs is that it lets contributors view the revision history of any changes made to Google documents, together with the date those changes were made. To preserve privacy in both personal and professional contexts, users can also manage who has access to their work. Furthermore, there is no chance of complete data loss due to a local disaster because papers are saved both online and on users' devices (Hanna, 2022). The researchers used this software to collaborate and discuss their plans through comments, as well as document the entire process before the implementation of the network.

3.2 Google Sheets

Spreadsheets can be created, updated, and modified using Google Sheets, an online tool that allows users to share data instantly. Additionally, it allows several geographically separated people to communicate via an integrated instant messaging app and work together simultaneously on a spreadsheet. Every modification is automatically saved by the application, and users may view the changes made by other users as they happen (Chai, 2021). The

researchers utilized this software to input the IP addresses after computation in an organized manner.

3.3 Lucidchart

Lucidchart is a web-based diagramming tool that enables users to work collaboratively in real-time to build a variety of diagrams, including software prototypes, mind maps, organizational charts, website wireframes, flowcharts, and Unified Modeling Language (UML) designs (*Overview of Lucidchart,* n.d.). The researchers used Lucidchart to duplicate the floor plans of Gemini Studios to visualize the layout of the network system.

3.4 Cisco Packet Tracer

Cisco Packet Tracer assists students in developing skills related to Cisco technology and learning networking concepts through practical experience. This program cannot take the role of hardware routers or switches because the protocols are implemented solely through software. It's interesting to note that this tool includes a wide range of networking equipment in addition to Cisco products (*What is Cisco Packet Tracer,* 2020). The researchers utilized Cisco Packet Tracer to simulate the network system and topology both in the physical and logical workspace.

3.5 IP Addressing

The Internet Protocol (IP) address of each network or internet-connected device serves as a unique identification. An IP address, which is often provided by an internet service provider (ISP), is a device address used for online communication. The computer making the request must be aware of the location of the website and how to get there each time a request is made to access it. The IP address is relevant in this situation. Every device has an IP address that can be uniquely identified; without this, information cannot be transferred (Yasar, 2023).

3.5.1 Classless Inter-Domain Routing (CIDR)

Classless Inter-Domain Routing is an IP address assignment technique that replaces the old approach based on Class A, Class B, and Class C networks and increases address distribution efficiency. The variable-length subnet mask approach, which modifies the ratio of network to host address bits in an IP address, is the foundation of CIDR (Gillis & Burke, 2024).

3.5.2 Variable-Length Subnet Mask (VLSM)

All subnet masks can have different sizes according to the Variable Length Subnet Mask (VLSM) design technique. A subnet is a partitioned portion of a larger network. This allows the utilization of various masks for distinct subnets inside a single class A, B, or C network. With VLSM, an IP address space can be divided into a well-defined hierarchy of subnets of different sizes (Awati, 2021).

3.6 Dynamic Host Configuration Protocol (DHCP)

Dynamic Host Configuration Protocol (DHCP) mechanism is used to dynamically assign an IP address to any device on a network so that it can connect via IP. Instead of requiring network managers to individually assign IP addresses to every network device, DHCP automates and centrally controls these configurations. Both large enterprise networks and small local networks can use DHCP (Gillis, 2023).

3.7 Domain Name System (DNS)

Internet domain names are found and converted into Internet Protocol (IP) addresses using a naming database called the domain name system (DNS). The IP address that a computer uses to find a website is mapped to the name that users use to find it by the domain name system. The majority of internet activities, including web browsing, depend on DNS to

swiftly provide the data required to link users to distant hosts. A hierarchy of authority governs DNS mapping across the internet (Lutkevich & Burke, 2021).

3.8 Virtual Local Area Network (VLAN)

A Virtual LAN (VLAN) is a type of logical overlay network that isolates traffic for each group of devices that share a physical LAN. By limiting the volume of traffic that a certain endpoint sees and processes, VLANs can enhance device performance. By dividing broadcast domains, VLANs limit the number of other hosts that a particular device can receive broadcasts from (Slattery & Burke, 2022).

3.9 Trunking

A network trunk is a communications connection or link that connects two places to the network by carrying several signals at once. In a communications system, switching centers are usually connected by trunks. Any kind of communications data can be transmitted via the signals (Kranz & Burke, 2021).

3.10 EtherChannel

A port link aggregation system called EtherChannel combines several physical port links into a single logical link. It is employed to offer redundancy and fast connections. A single logical link can be created by combining up to eight links. Combining several physical lines between two network switches into a single logical link is a technique used in computer networks. This logical link offers better load balancing, more bandwidth, and redundancy (*EtherChannel in computer network,* 2023).

3.11 Enhanced Interior Gateway Routing Protocol (EIGRP)

The Enhanced Interior Gateway Routing Protocol (EIGRP) allows routers to communicate with each other more effectively. EIGRP was created as a result of Cisco's efforts to provide a straightforward protocol that would allow network administrators to adapt to changing needs without having to alter the wide area network routing architecture. A replica of its neighbor's routing tables is maintained by an EIGRP-based router. It asks its neighbors for a route if it is unable to locate one in one of these tables, and it asks its neighbors until a route is identified (Sheldon, 2022).

3.12 Open Shortest Path First (OSPF)

Open Shortest Path First (OSPF) determines the most effective way to route traffic on IP networks using a mathematical formula. Within a single autonomous system, OSPF disperses routing data among routers. This feature sets OSPF apart from earlier TCP/IP routing systems, which were created for networks that were simpler than those in use today (Awati & Burke, 2023).

3.13 File Transfer Protocol (FTP)

File Transfer Protocol (FTP) is used to send files between computers connected to TCP/IP networks. The end user's machine is usually referred to as the local host in an FTP transaction. A remote host, typically a server, is the second machine in an FTP session. To transfer data via FTP, both computers need to be networked and set up correctly. To use FTP services, servers need to be configured to operate them, and clients need to have FTP software installed (Gillis, 2024).

3.14 Simple Mail Transfer Protocol (SMTP)

A TCP/IP protocol called SMTP (Simple Mail Transfer Protocol) is used to send and receive emails via networks like the Internet. Email clients and mail servers can communicate data because it offers a standardized way to deliver emails. This makes email communication common, simple, and dependable (Awati & Gillis, 2024).

3.15 IP Telephony

Analog speech signals are converted into data packets for IP telephony, which are subsequently sent via the Internet Protocol. Devices like routers, which scan packet headers and forward them to their destinations, come into contact with data packets as they travel across networks (Doan, 2024).

3.16 Port Security

Port Security is a method of managing which devices have network access. It is meant to reduce the possibility of unwanted access to the network and shield it from malevolent assaults. It also regulates how data enters and exits the network. (Aakriti, 2024).

3.17 Authentication, Authorization, and Accounting (AAA) Authentication

A security framework called Authentication, Authorization, and Accounting (AAA) is used to monitor and manage user access on a computer network. AAA delivers the data required to bill for services, audits usage, enforces policies, and intelligently manages access to computer resources. Effective network management, security, and access control depend on these interrelated procedures (Gillis, 2024b).

CHAPTER IV

METHODOLOGY

The chapter deals with the methods applied in developing the proposed network system to achieve the needs of Gemini Studios on a multi-branch setup across Cebu, Manila, and Davao. This includes network addressing and allocation, network infrastructures and management, network security, and communication and virtualization systems. Therefore, by explaining the above steps, this chapter proves the feasibility and the success of the proposed system.

4.1 Structured Cabling

By using standardized cable type, in this case, copper straight-throughs and crossover cables, structured cabling ensures efficient, scalable, and high-speed communication with minimal signal loss or interference. For the simplification of maintenance and organization purposes, copper wall mounts connect the computers and IP telephones to the patch panel.

4.2 IP Addressing and Subnetting

The effectiveness and adaptability of network administration are improved by IP addressing with CIDR (Classless Inter-Domain Routing) and VLSM (Variable Length Subnet Masking). CIDR substitutes a prefix-based scheme for strict class-based addressing, enabling more precise IP range distribution. To maximize address consumption, VLSM expands this subnet flexibility by allowing various subnet sizes inside the same network. The computed network addresses and their IP addresses were assigned.

4.3 IP Assignment and Distribution Through DHCP

Devices on a network can be assigned IP addresses automatically with the use of DHCP (Dynamic Host Configuration Protocol). The DHCP server receives a request from a connected

device and assigns an available IP address as well as other necessary network configurations, such as the subnet mask, gateway, and DNS server. This makes the network more dependable and scalable by doing away with the need for manual IP configuration, lowering the possibility of IP conflicts, and guaranteeing effective IP management.

4.4 Trunking

Trunking is a networking technique that tags each packet with a VLAN (Virtual Local Area Network) identity, enabling many data streams to pass over a single physical link. This preserves network segmentation while facilitating effective communication between devices in various VLANs. To eliminate the need for extra physical connections, switches frequently employ trunking to connect many VLANs over a single cable. It is perfect for large or complicated network systems because it improves network scalability, streamlines management, and maximizes bandwidth use.

4.5 Routing Protocols

The routing protocols OSPF (Open Shortest Path First) and EIGRP (Enhanced Interior Gateway Routing Protocol) assist networks in determining the most efficient routes for data transmission. While OSPF creates a network map and determines the shortest path, EIGRP rapidly calculates routes using parameters like speed and dependability. They provide seamless data flow by making networks faster, more dependable, and flexible.

4.6 Network Redundancy

Redundancy in network systems, achieved through mechanisms like HSRP (Hot Standby Router Protocol) and EtherChannel, enhances reliability and availability. HSRP provides router redundancy by enabling a group of routers to share a virtual IP address, ensuring uninterrupted connectivity if the primary router fails. EtherChannel combines multiple

physical links into a single logical link, increasing bandwidth and providing failover capabilities if one link fails. Together, these technologies prevent single points of failure, optimize traffic handling, and maintain seamless network operations, crucial for critical systems.

4.7 Access Control and Security Protocols

By limiting access and safeguarding communications, security protocols including Port Security, SSH, Telnet, ACL, and AAA safeguard network systems. Port security restricts device connections on switch ports to prevent unwanted access. Telnet permits remote access but is outdated and unsafe; SSH should be used instead. SSH guarantees encrypted and secure remote management. Data packets are allowed or denied by Access Control Lists (ACLs), which filter traffic according to predefined criteria. By confirming identities, limiting permissions, and monitoring activity, authentication, authorization, and accounting, or AAA, controls user access. When combined, these methods improve network security, reduce threats, and stop illegal access and data breaches.

4.8 Virtual Network Partition

By dividing a network into separate groups, VLAN (Virtual Local Area Network) was used to organize traffic, lower congestion, and improve security. It improves efficiency and control by enabling devices to interact as though they were on the same physical network, even if they are geographically dispersed.

4.9 Host Resolution and Record Access

DNS (Domain Name System) servers convert human-readable domain names into machine-readable IP addresses for host resolution and record access. DNS records are managed and stored by DNS servers. Users can efficiently access websites and services thanks to this method. By offering a scalable, centralized method of converting domain names to

IP addresses, DNS enhances network systems by lowering the need for users to commit complicated numerical values to memory and enabling quicker internet access and browsing.

4.10 IP Telephony

IP telephony replaces traditional phone lines by transmitting voice conversations over IP networks or the internet. Voice signals are transformed into digital data packets and sent over IP networks to accomplish their function. Devices can find and connect through DNS (Domain Name System) servers, which convert domain names into IP addresses. While DNS guarantees dependable access to services by effectively resolving domain names, IP telephony enhances scalability and cost-effectiveness in network systems, guaranteeing seamless communication and connectivity.

4.11 Internal Mail Transfer

Through a number of relays, emails are routed from the sender's server to the recipient's server using SMTP (Simple Mail Transfer Protocol). By offering a dependable means of communication between mail servers, SMTP supports network systems and guarantees that messages are delivered across various email platforms and networks. It is crucial to guarantee the effectiveness and security of email-based communication.

4.12 Multi-User Setup

With a multi-user arrangement, several people can access and utilize a system at once, each with their unique permissions and preferences. Because it allows for simultaneous access to data, apps, and services, this configuration is essential for network systems because it promotes resource sharing, enhances teamwork, and maximizes efficiency. Because administrators can control user roles and access control, it improves scalability and security by making sure that resources are used efficiently while preserving system integrity.

4.13 Main Branch: Cebu

The main branch, consisting of eight departments, is situated at IT Park, Lahug, Cebu. Two Cisco 2811 routers, two Cisco 3560-24PS multilayer switches, and seven Cisco 2960 switches will be used in the network configuration. To optimize address efficiency, each department will have its own VLAN and IP addresses will be assigned via Variable Length Subnet Masking (VLSM). For redundancy, DHCP services will operate on both the primary and backup routers. Important tasks including domain name resolution, AAA services, email protocols (SMTP and POP), and file transfers via FTP will be handled by the server.

Between switches, EtherChannel will be used to increase bandwidth and offer connection redundancy, guaranteeing that data will continue to flow even in the event of a link failure. Router redundancy will be provided by Hot Standby Router Protocol (HSRP), in which one router is operational while the other is in standby mode, taking over in the event that the first router is unable to maintain uninterrupted network access. For dynamic routing, Open Shortest Path First (OSPF) will be used to maximize communication between network parts, guaranteeing dependable and effective data transfer. The branch will benefit from a safe, scalable, and robust network thanks to this configuration.

4.14 Branch 1: Manila

Branch 1 includes two departments and is headquartered in The Manila Times Building 2310 Taft Avenue, Malate, Manila. It will make use of two Cisco 2960 switches and a Cisco 2811 router, serving nine devices in total—six PCs and three IP phones. IP addresses will be distributed using CIDR for effective address space management, and each department will be given its own VLAN. For easier network administration, the router will offer DHCP services, which will dynamically assign IP addresses to devices inside each VLAN.

To ensure seamless communication and information sharing inside the branch, a centralized server would manage necessary services including SMTP/POP for email management, FTP for file transfers, and AAA for secure access control. EIGRP's rapid convergence and low bandwidth consumption will be utilized for routing, maximizing data flow between network segments. This configuration, which includes centralized server services, router-hosted DHCP, CIDR-based VLANs, and EIGRP, ensures dependable, secure, and effective connectivity throughout the departments.

4.15 Branch 2: Davao

A CISCO 2811 router and two Cisco 2960 switches will be installed in Branch 2, which will house two departments in Davao Park District, Lanang, Davao. Nine devices in all, including three IP telephones and six PCs, will be supported by the branch. To optimize address efficiency, each department will have a separate VLAN with IP addresses assigned via CIDR. network administration will be made easier by the router’s management of DHCP services, which guarantee automated IP assignment for devices inside each VLAN.

To provide efficient communication and data transmission inside the branch, a central server will oversee essential services including SMTP/POP for email handling, FTP for file sharing, and AAA for secure access control. The routing protocol, EIGRP, will be utilized to guarantee quick and effective data transfer between departments while dynamically adjusting to network changes. For Branch 2, this configuration offers a safe, effective, and dependable network infrastructure.

4.16 ISP: PLDT and Globe

Two Cisco 2911 routers will make up the ISP arrangement, and they will each be tasked with managing connections for Globe and PLDT, two separate ISPs. By offering redundancy, this arrangement aims to guarantee the organization's continuous and dependable connectivity.

The other router will smoothly take over if one ISP connection fails, guaranteeing uninterrupted network access.

To maximize bandwidth utilization and avoid network congestion, the configuration will also include load balancing, which divides traffic between the two ISPs. In addition to enhancing network performance generally, this guarantees that the company's internet services continue to function properly even during periods of high traffic. The routers will also be set up with security features to guard against possible dangers and illegal access, providing several branches with safe network services. No matter which ISP is managing the traffic at any one time, the system's load balancing and failover features guarantee that all branches may continue to have consistent access to network resources.

CHAPTER V

DISCUSSION AND IMPLEMENTATION

To ensure Gemini Studios' network is secure, reliable, and resilient against disruptions or downtime, Layer 2 redundancy is implemented across all branches to provide optimal fault tolerance and reliability for Layer 2 devices.

The server for Gemini Studios is located at the main branch within the IT department, where it provides essential services such as AAA, HTTP, FTP, and email to all branches. Placing the server in the IT department facilitates direct maintenance and efficient management of its services.

Switches and routers in Gemini Studios' network are assigned to a dedicated management subnet. This isolated subnet enhances security by reducing the risk of exposure to attacks or accidental misconfigurations originating from user devices.

Structured cabling forms the backbone of Gemini Studios' physical network topology, offering a standardized framework that supports scalability and flexibility. This systematic organization minimizes signal interference, enhances network performance, and ensures efficient data and voice communication. Wall mounts and patch panels neatly arrange wiring across various floors and offices in all branches.

Intermediary Distribution Facilities (IDFs) house switches and patch panels, securing these devices against unauthorized access. These IDFs are equipped with locks, granting access to authorized management personnel exclusively.

Virtual Local Area Networks (VLANs) play a critical role in Gemini Studios' network by enhancing security, performance, and scalability while simplifying management and reducing costs. VLANs facilitate efficient communication and safeguard sensitive data across departments and branches.

Classless Inter-Domain Routing (CIDR) and Variable Length Subnet Masking (VLSM) are used to calculate and assign network addresses accurately, ensuring appropriate IP allocation for all devices across branches.

IP telephony is deployed in all branches of Gemini Studios, offering cost-effective, flexible, and feature-rich communication solutions. This implementation improves internal coordination, customer service, and overall operational efficiency.

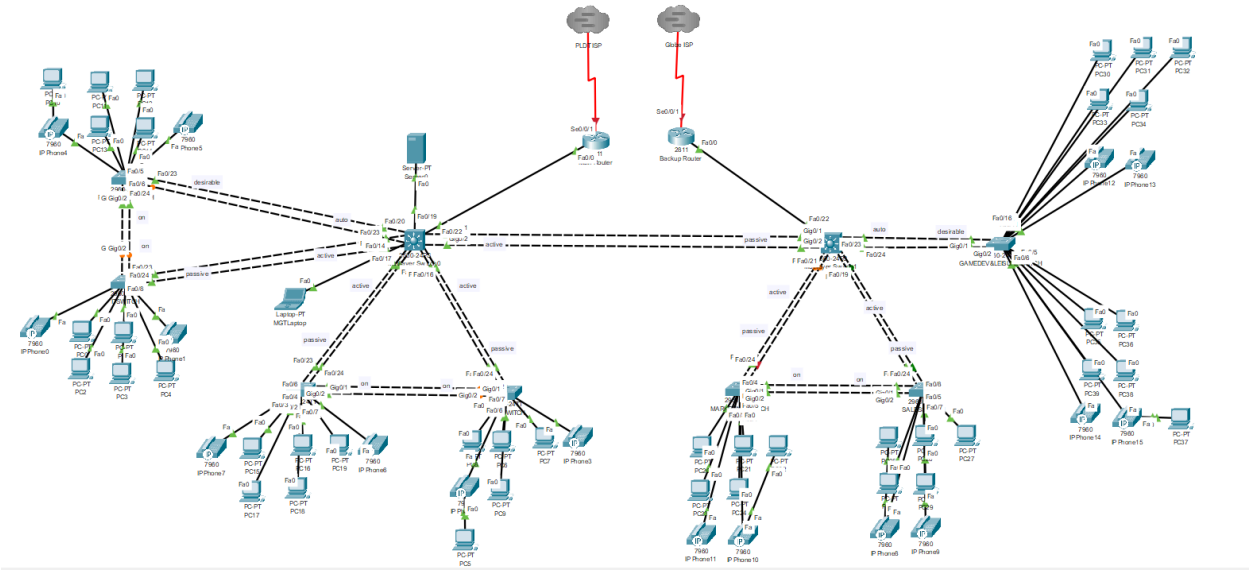
The multiuser setup in Packet Tracer is utilized to simulate Gemini Studios' network infrastructure. This ensures all aspects of the network—such as VLANs, redundancy, and inter-branch communication—are rigorously tested and optimized.

A controller-based Wireless Local Area Network (WLAN) using a Wireless LAN Controller (WLC) is implemented, providing a secure, scalable, and efficient wireless network structure. This setup supports seamless connectivity across branches, centralized management, and robust security for wireless devices.

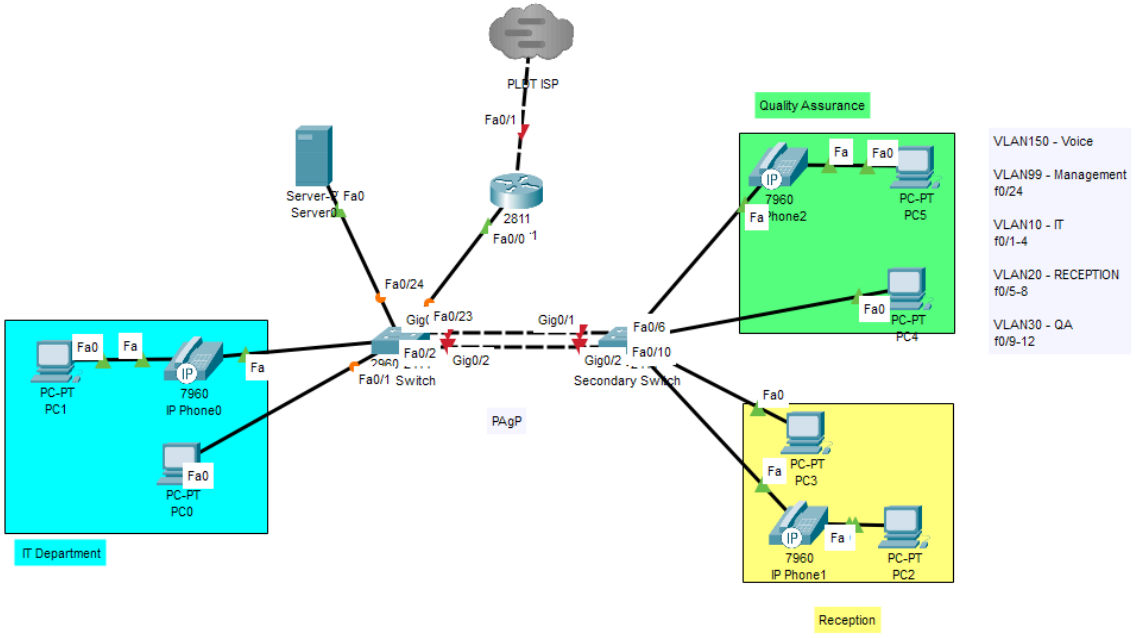
Network security is further strengthened by implementing port security on switches and enforcing strict access controls on the console and VTY lines of switches and routers. This approach prevents unauthorized device access, safeguarding the network against potential breaches and ensuring that sensitive information remains secure and confined within the organization.

The following page displays the logical topology of Gemini Studios as seen in Packet Tracer.

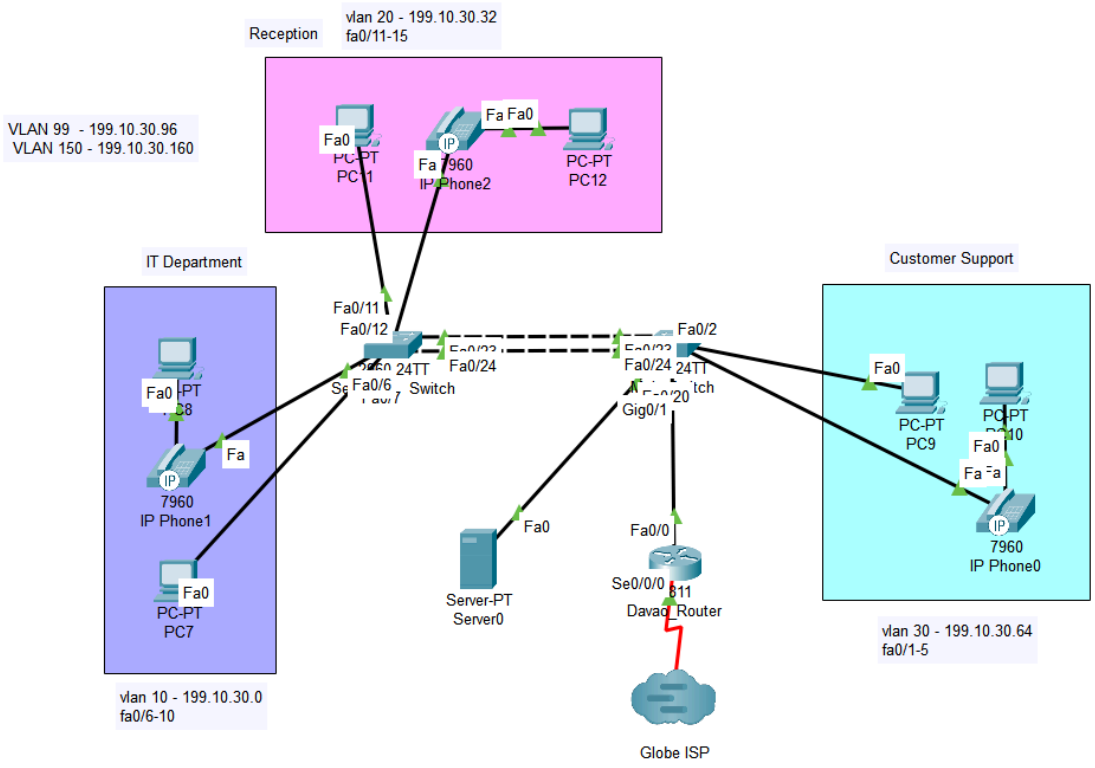
MAIN BRANCH - CEBU



BRANCH 1 - MANILA



BRANCH 2 - DAVAO



CHAPTER VI

CONCLUSION AND RECOMMENDATION

Gemini Studios' cutting-edge technology and creative game production techniques position the company to have a big impact on the gaming industry. The firm aims to provide players with distinctive narrative-driven experiences by fusing cutting-edge technology that matches the quality of its gameplay. Gemini Studios is laying the groundwork for a dynamic growth trajectory in the gaming industry with its expansion across three branches in Cebu, Manila, and Davao. Its infrastructure will be essential to achieving this goal.

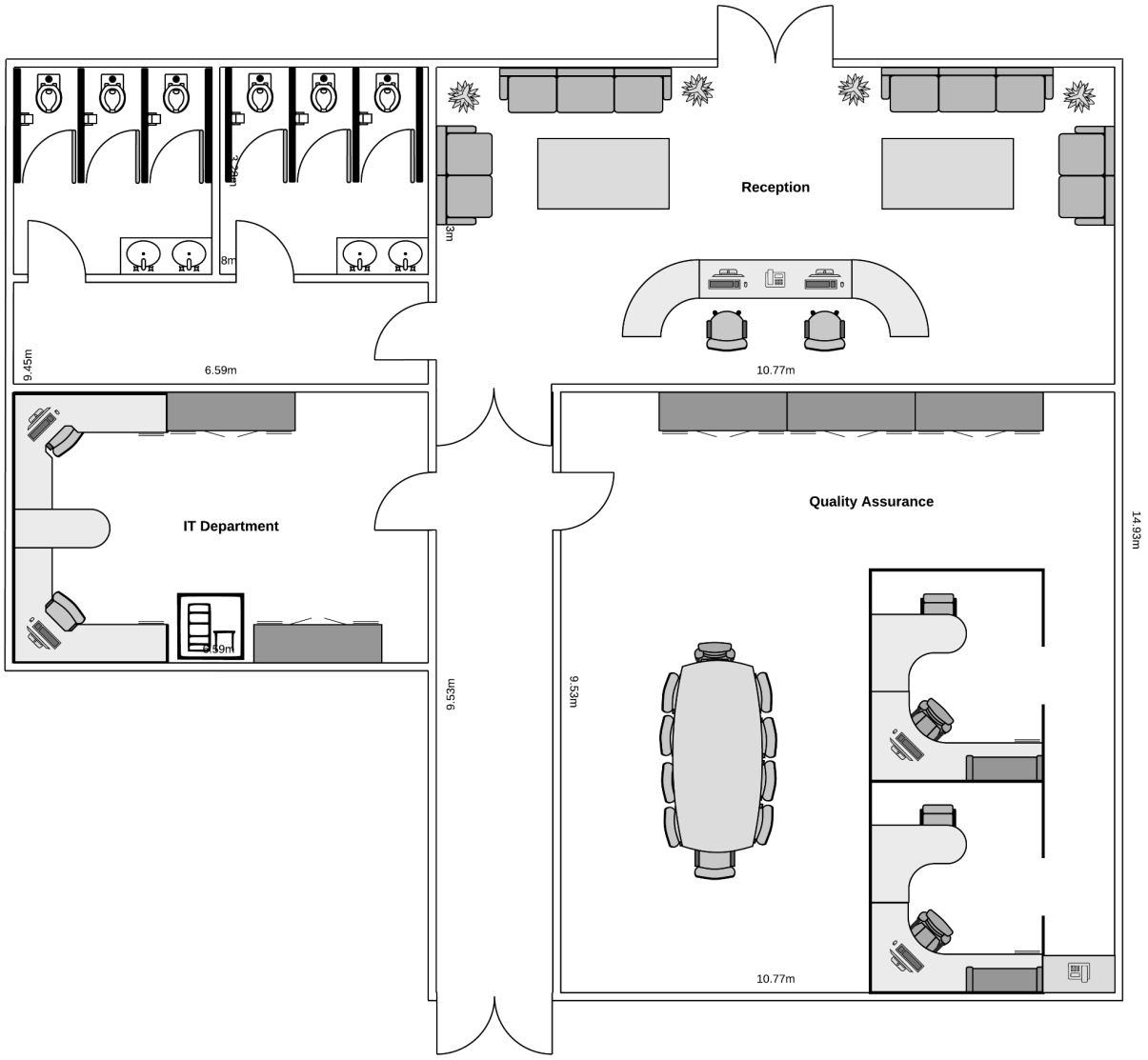
The suggested network system is built with scalability, security, and dependability in mind to guarantee seamless operations across all of its branches. Structured cabling provides the framework for effective data and voice connection, while Layer 2 redundancy is applied across the network to offer fault tolerance and reduce interruptions. Because VLANs separate traffic between departments, they improve security and performance while protecting sensitive data. Additionally, by giving switches and routers their control subnet, network administration is made easier, and overall security is increased.

Gemini Studios places a high premium on security and has implemented several safeguards to preserve the network infrastructure. Using Wireless LAN Controllers (WLC) for secure wireless communication, port security on switches, and access control on console and VTY lines all help to create a strong defense against any cyberattacks. With these security measures in place, along with centralized network management and IP telephony for better communication, Gemini Studios' network is prepared to meet the needs of a developing game business while protecting sensitive information and preserving operational effectiveness.

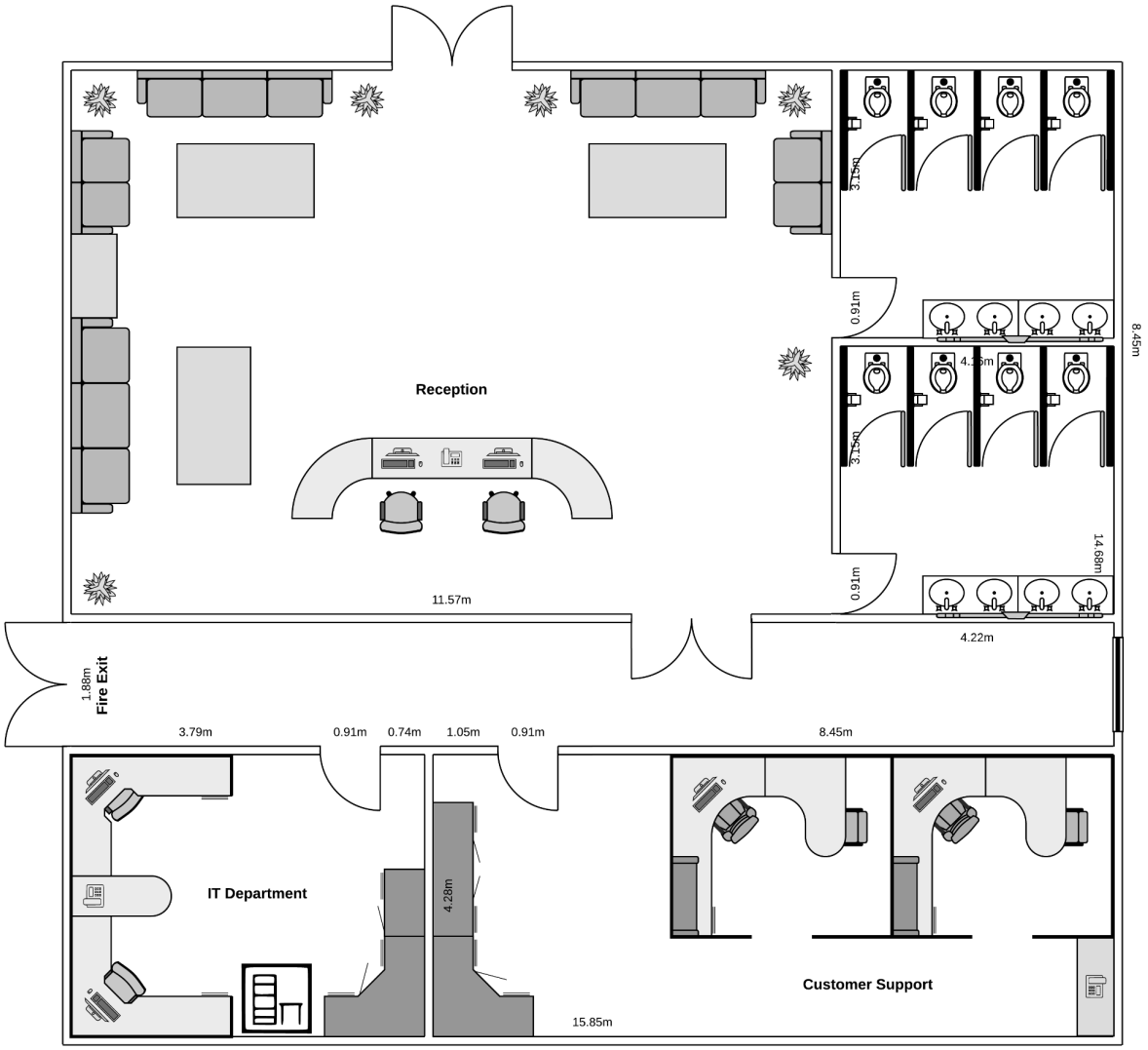
APPENDICES

Appendix A

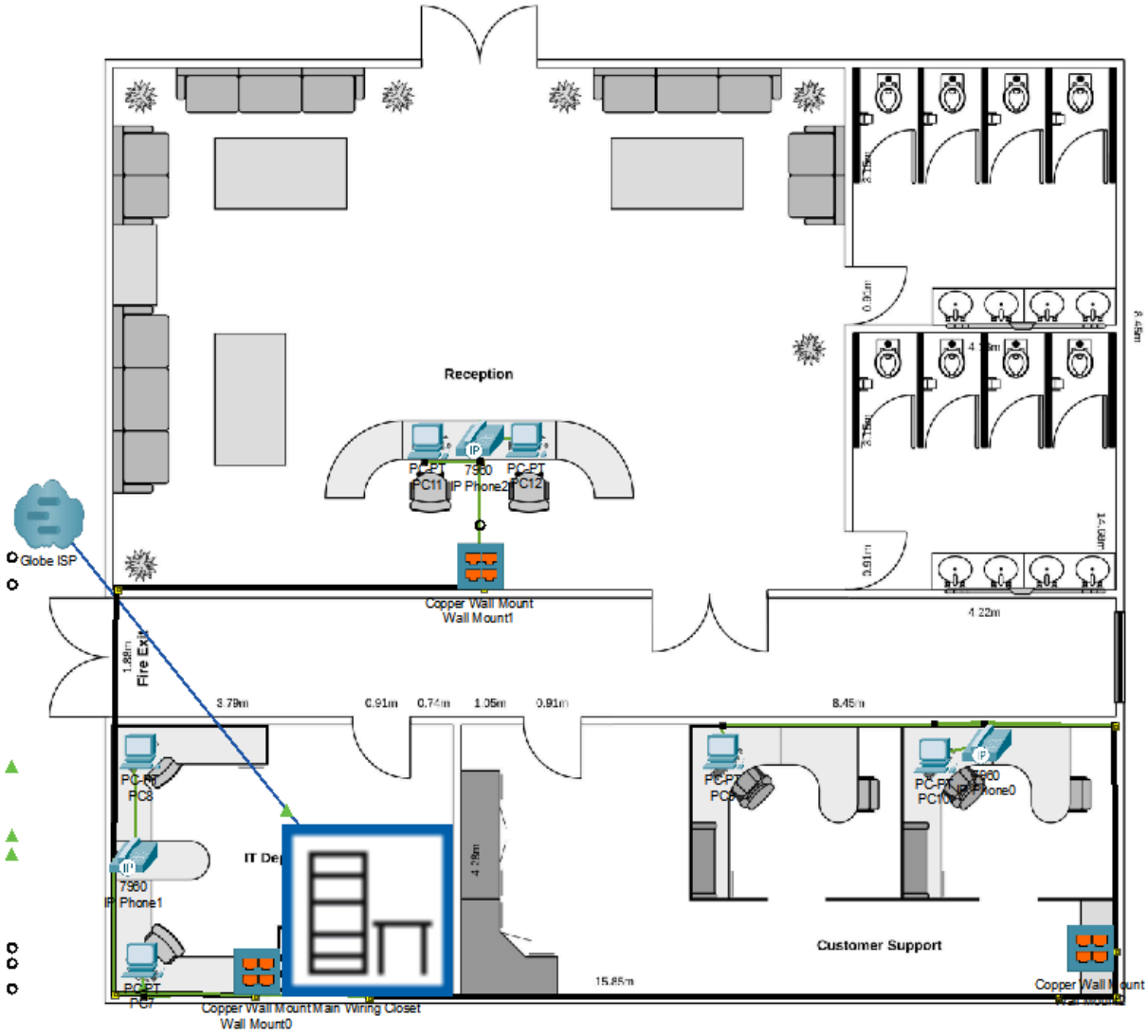
Floor Plans



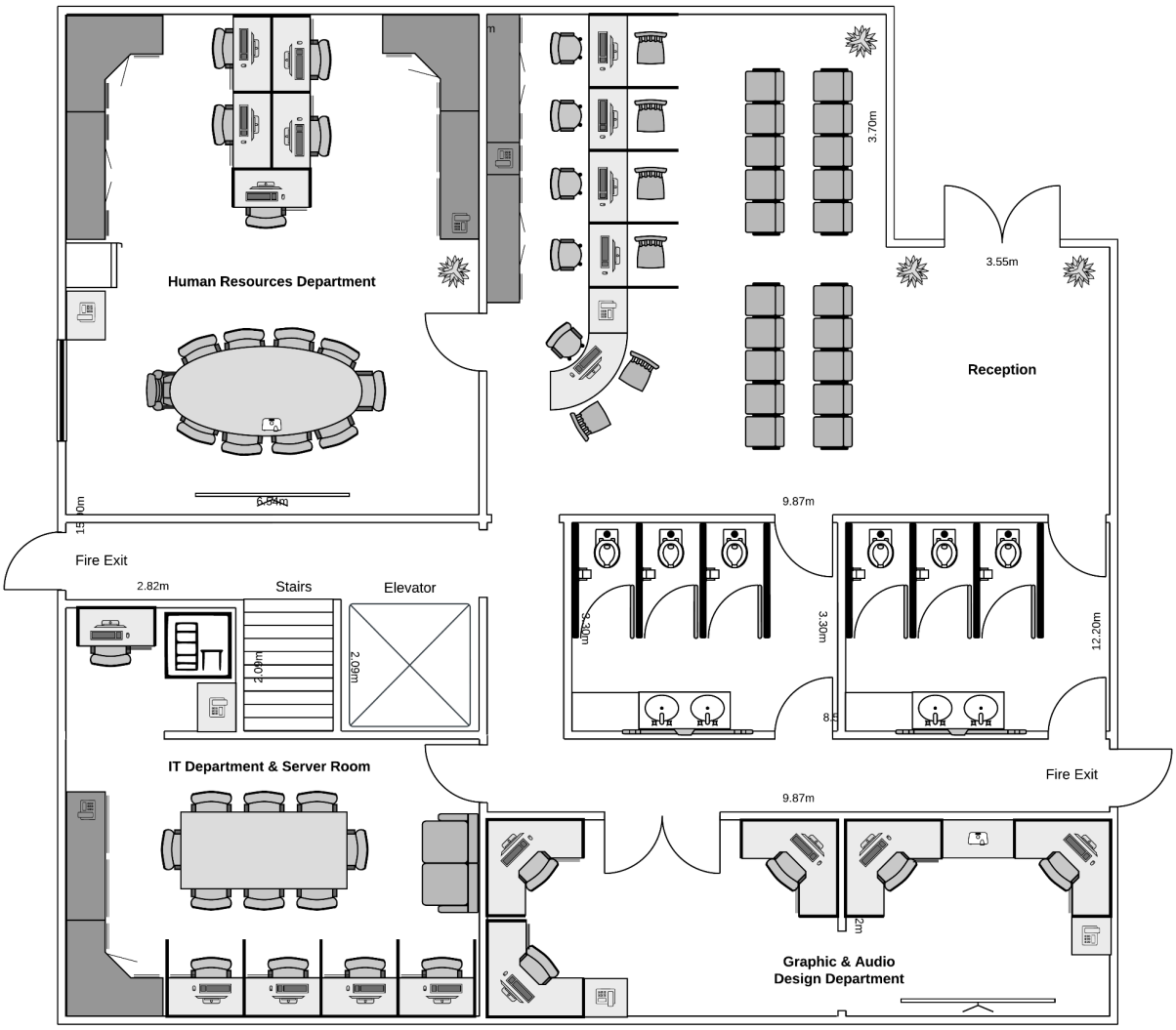
Branch 1 - Manila Floor Plan



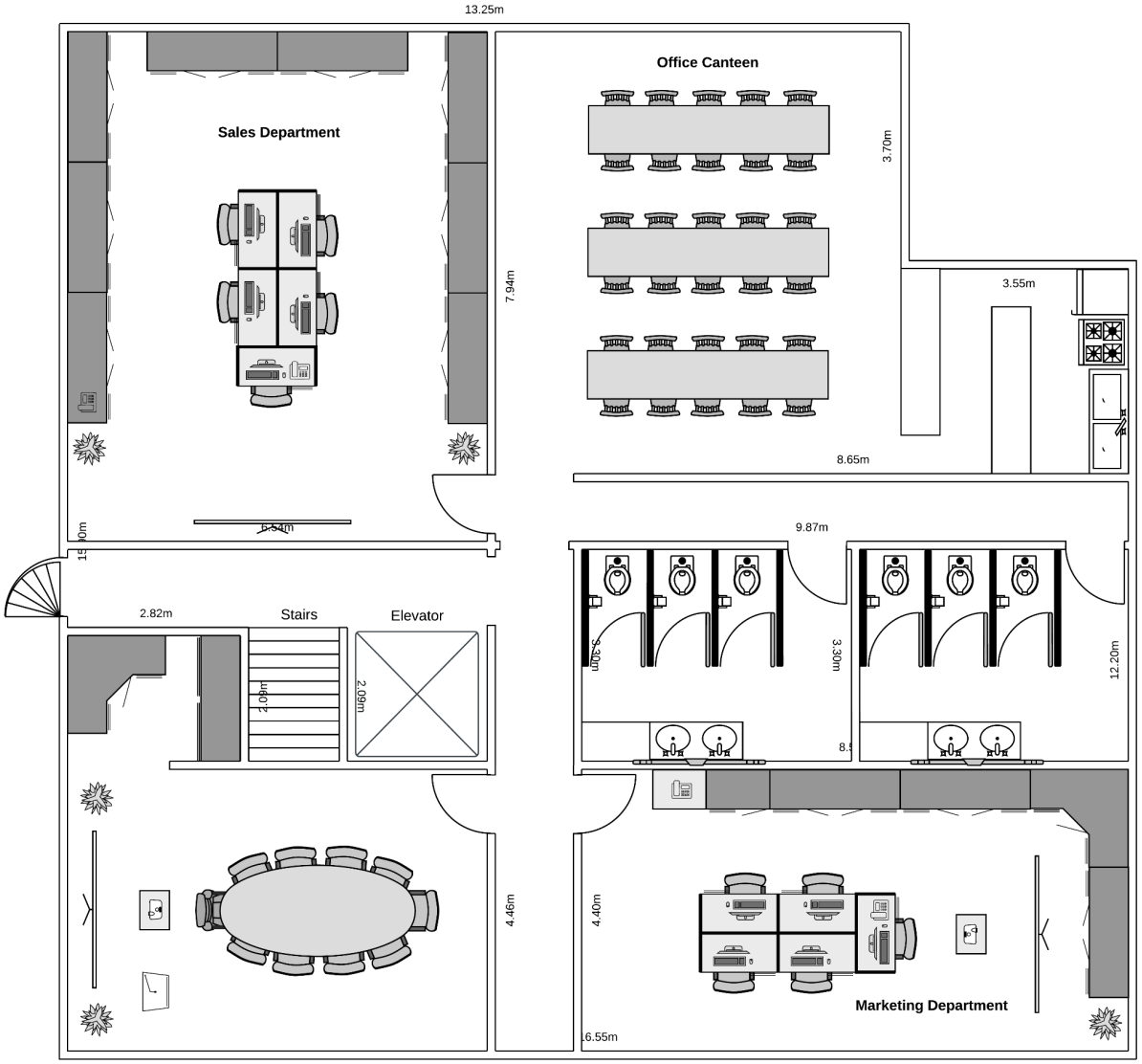
Branch 2 - Davao Floor Plan



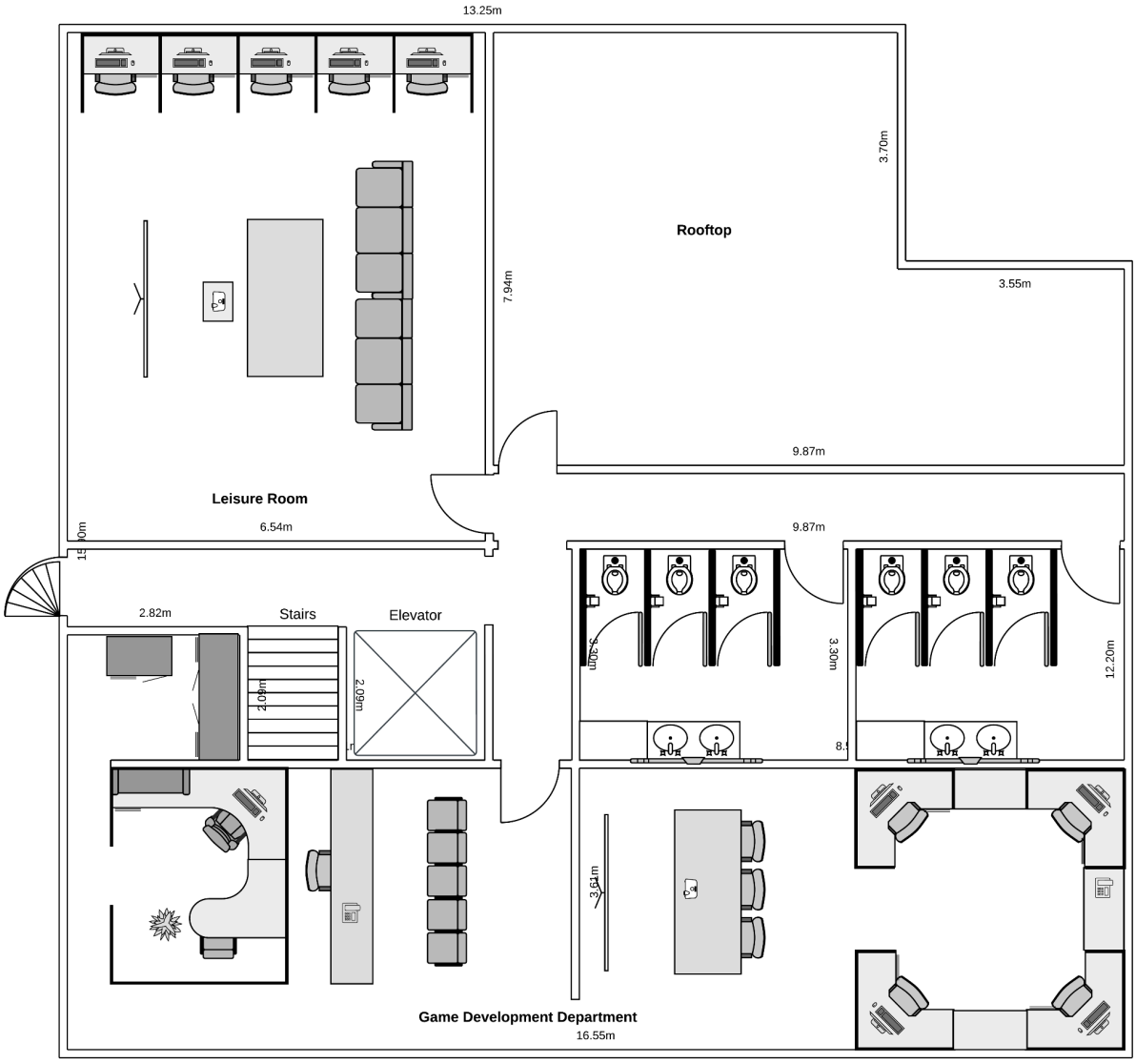
Branch 2 - Davao Floor Plan in Physical Mode View



Main Branch Floor 1 - Cebu



Main Branch Floor 2 - Cebu



Main Branch Floor 3 - Cebu

Appendix B

Codes

Branch 1 - Manila

```
Unset
ena
conf t
hostname MNL_RTR
banner motd $warning! unauthorized access is prohibited!$
enable secret cisco
service password-encryption

ip domain-name manila.com
crypto key generate rsa general-keys mod 1024
ip ssh version 2
username admin password cisco

aaa new-model
aaa authentication login BRANCH1 group radius local
aaa accounting exec default start-stop group radius

radius server BRANCH1
address ipv4 199.10.20.105
key radiuspa55

line con 0
login authentication BRANCH1
line vty 0 4
transport input ssh
login authentication BRANCH1

conf t

ip dhcp excluded-address 199.10.20.1 199.10.20.10
ip dhcp excluded-address 199.10.20.33 199.10.20.43
ip dhcp excluded-address 199.10.20.65 199.10.20.75
ip dhcp excluded-address 199.10.20.97 199.10.20.107
ip dhcp excluded-address 199.10.20.129 199.10.20.139

ip dhcp pool VLAN10IT
network 199.10.20.0 255.255.255.224
default-router 199.10.20.1
dns-server 199.10.20.105
domain-name manila.com

ip dhcp pool VLAN20RECEPTION
network 199.10.20.32 255.255.255.224
default-router 199.10.20.33
```

```
dns-server 199.10.20.105
domain-name manila.com

ip dhcp pool VLAN30QA
network 199.10.20.64 255.255.255.224
default-router 199.10.20.65
dns-server 199.10.20.105
domain-name manila.com

ip dhcp pool VLAN99MGMT
network 199.10.20.96 255.255.255.224
default-router 199.10.20.97
dns-server 199.10.20.105
domain-name manila.com

ip dhcp pool VLAN150VOICE
network 199.10.20.128 255.255.255.224
default-router 199.10.20.129
option 150 ip 199.10.20.129

int f0/0
no shut

int f0/0.10
encap dot1Q 10
ip add 199.10.20.1 255.255.255.224

int f0/0.20
encap dot1Q 20
ip add 199.10.20.33 255.255.255.224

int f0/0.30
encap dot1Q 30
ip add 199.10.20.65 255.255.255.224

int f0/0.99
encap dot1Q 99
ip add 199.10.20.97 255.255.255.224

int f0/0.150
encap dot1Q 150
ip add 199.10.20.129 255.255.255.224

telephony-service
max-dn 5
max-ephones 5
ip source-address 199.10.20.129 port 2000
auto assign 1 to 5

ephone-dn 1
```

```
number 2001
ephone-dn 2
number 2002
ephone-dn 3
number 2003
ephone-dn 4
number 2004
ephone-dn 5
number 2005

router eigrp 10
network 199.10.20.0 255.255.255.224
network 199.10.20.32 255.255.255.224
network 199.10.20.64 255.255.255.224
network 199.10.20.96 255.255.255.224
network 199.10.20.128 255.255.255.224
network 10.10.10.0 255.255.255.252
```

Branch 2 - Davao

```
Unset
=========================DAVAO============================
----------------------MAIN SWITCH-------------------------

ena
conf t
hostname MAIN_SW
banner motd $warning! unauthorized access is prohibited!$
enable secret cisco
service password-encryption
line con 0
password cisco
login
line vty 0 4
pass cisco
login local
transport input ssh

ip domain-name davao.com
crypto key generate rsa general-keys mod 1024
ip ssh version 2
username admin password cisco

vlan 10
name IT
vlan 20
name RECEPTION
```

```
vlan 30
name SUPPORT
vlan 99
name MGMT
vlan 150
name VOICE

vtp domain davao.com
vtp mode server

int ra fa0/23-24
channel-group 1 mode desirable
int po1
sw mode trunk
sw trunk native vlan 99
sw trunk all vlan 1-1000
no shut

int ra f0/1-5
sw mode acc
sw acc vlan 30
sw voice vlan 150

int fa0/20
sw mode acc
sw acc vlan 99
sw voice vlan 1-1000

int g0/1
sw mode trunk
sw trunk native vlan 99
sw trunk all vlan 1-1000

int vlan 99
ip add 199.10.30.97 255.255.255.224
no shut

int ra fa0/1-5, fa0/24
sw port-security
sw port-security maximum 2
sw port-security mac-address sticky
sw port-security violation restrict

int ra fa0/6-19, fa0/21-22
shut

do wr memory

----------------------SECONDARY SWITCH--------------------
```

```
ena
conf t
hostname SECONDARY_SW
banner motd $warning! unauthorized access is prohibited!$
enable secret cisco
service password-encryption
line con 0
password cisco
login
line vty 0 4
pass cisco
login local
transport input ssh

ip domain-name davao.com
crypto key generate rsa general-keys mod 1024
ip ssh version 2
username admin password cisco

vlan 10
name IT
vlan 20
name RECEPTION
vlan 30
name SUPPORT
vlan 99
name MGMT
vlan 150
name VOICE

vtp domain davao.com
vtp mode client

int ra fa0/6-10
sw mode acc
sw acc vlan 10
sw voice vlan 150

int ra fa0/11-15
sw mode acc
sw acc vlan 20
sw voice vlan 150

int ra fa0/23-24
channel-group 1 mode auto
int po1
sw mode trunk
sw trunk native vlan 99
sw trunk all vlan 1-1000
no shut
```

```
int vlan 99
ip add 199.10.30.96 255.255.255.224
no shut

int ra fa0/6-10, fa011-15, fa0/23-24
sw port-security
sw port-security maximum 2
sw port-security mac-address sticky
sw port-security violation restrict

int ra f0/1-5
shut

do wr memory

-------------------------MAIN ROUTER----------------------

en
config t
hostname Branch2_Router
banner motd %Warning! Unauthorized access is not allowed!!!%
enable secret cisco
service password-encryption

username admin password cisco
ip domain-name davao.com
crypto key generate rsa general-keys mod 1024

aaa new-model
aaa authentication login RAD-LOGIN group radius
radius server RAD-LOGIN
address ipv4 199.10.30.165 auth-port 1645
key radiuspa55
line con 0
login authentication RAD-LOGIN
line vty 0 4
login authentication RAD-LOGIN
transport input ssh
exit
aaa accounting exec default start-stop group radius

int fa0/0
no shut

int f0/0.10
encap dot1Q 10
ip add 199.10.30.1 255.255.255.224

int f0/0.20
```

```
encap dot1Q 20
ip add 199.10.30.33 255.255.255.224

int f0/0.30
encap dot1Q 30
ip add 199.10.30.65 255.255.255.224

int f0/0.99
encap dot1Q 99
ip add 199.10.30.97 255.255.255.224

int f0/0.150
encap dot1Q 150
ip add 199.10.30.129 255.255.255.224

int se0/0/0
ip add 30.30.30.1 255.255.252
no shut
exit

ip dhcp excluded-address 199.10.30.1 199.10.30.10
ip dhcp excluded-address 199.10.30.33 199.10.30.43
ip dhcp excluded-address 199.10.30.65 199.10.30.75
ip dhcp excluded-address 199.10.30.97 199.10.30.107
ip dhcp excluded-address 199.10.30.129 199.10.30.139

ip dhcp pool VLAN10IT
network 199.10.30.0 255.255.255.224
default-router 199.10.30.1
dns-server 199.10.30.105
domain-name davao.com

ip dhcp pool VLAN20RECEPTION
network 199.10.30.32 255.255.255.224
default-router 199.10.30.33
dns-server 199.10.30.105
domain-name davao.com

ip dhcp pool VLAN30SUPPORT
network 199.10.30.64 255.255.255.224
default-router 199.10.30.65
dns-server 199.10.30.105
domain-name davao.com

ip dhcp pool VLAN99MGMT
network 199.10.30.96 255.255.255.224
default-router 199.10.30.97
dns-server 199.10.30.105
domain-name davao.com
```

```
ip dhcp pool VLAN150VOICE
network 199.10.30.128 255.255.255.224
default-router 199.10.30.129
option 150 ip 199.10.30.129

telephony-service
max-dn 5
max-ephones 5
ip source-address 199.10.30.129 port 2000
no auto assign 1 to 5

ephone-dn 1
number 3001
ephone-dn 2
number 3002
ephone-dn 3
number 3003
ephone-dn 4
number 3004
ephone-dn 5
number 3005

router eigrp 10
network 199.10.30.0 255.255.255.224
network 199.10.30.32 255.255.255.224
network 199.10.30.64 255.255.255.224
network 199.10.30.96 255.255.255.224
network 199.10.30.128 255.255.255.224
no network 10.10.10.0 255.255.255.252
network 30.30.30.0 255.255.255.252

-------------------------GLOBE ISP 1-----------------------

ena
config t
hostname Globe1
banner motd %Warning! Unauthorized access is not allowed!!!%
enable secret cisco
service password-encryption
line con 0
pass cisco
login local
line vty 0 4
pass cisco
login local
transport input ssh
username admin password cisco
ip domain-name cisco.com
crypto key generate rsa general-keys mod 1024
```

```
int s0/0/0
ip add 31.31.31.1 255.255.255.252
no shut
exit
int lo0
ip add 199.10.30.193 255.255.255.224
no shut
exit

router eigrp 10
network 30.30.30.0 0.0.0.3
network 31.31.31.0 0.0.0.3
network 199.10.30.192 0.0.0.31

-------------------------GLOBE ISP 2-----------------------

ena
config t
hostname Globe2
banner motd %Warning! Unauthorized access is not allowed!!!%
enable secret cisco
service password-encryption
line con 0
pass cisco
login local
line vty 0 4
pass cisco
login local
transport input ssh
username admin password cisco
ip domain-name cisco.com
crypto key generate rsa general-keys mod 1024

int s0/0/0
ip add 30.30.30.2 255.255.255.252
no shut
exit
int s0/0/1
ip add 13.13.13.2 255.255.255.252
no shut
exit
int lo0
ip add 199.10.30.225 255.255.255.0
no shut
exit

router eigrp 10
network 30.30.30.0 0.0.0.3
network 31.31.31.0 0.0.0.3
network 199.10.30.224 0.0.0.31
```

Main Branch - Cebu

```
Unset
!-- Cebu Branch Config --!

ena
conf t
hostname CEBU_MAINRTR
banner motd $warning! unauthorized access is prohibited!$
enable secret cisco
service password-encryption
line con 0
password cisco
login authentication MAINBRANCH
line vty 0 4
pass cisco
login authentication MAINBRANCH
transport input ssh

aaa new-model
aaa authentication login MAINBRANCH group radius local
aaa accounting exec default start-stop group radius

radius server MAINBRANCH
address ipv4 199.10.10.37 auth-port 1645
key radiuspa55

ip domain-name gemini.com
crypto key generate rsa general-keys mod 1024
ip ssh version 2
username admin password cisco

ip dhcp excluded-address 199.10.10.33 199.10.10.43
ip dhcp excluded-address 199.10.10.65 199.10.10.75
ip dhcp excluded-address 199.10.10.97 199.10.10.107
ip dhcp excluded-address 199.10.10.129 199.10.10.139
ip dhcp excluded-address 199.10.10.161 199.10.10.171
ip dhcp excluded-address 199.10.10.193 199.10.10.203
ip dhcp excluded-address 199.10.10.225 199.10.10.235
ip dhcp excluded-address 199.10.11.1 199.10.11.10
ip dhcp excluded-address 199.10.11.17 199.10.11.27
ip dhcp excluded-address 199.10.11.33 199.10.11.43

ip dhcp pool ITPOOL
network 199.10.10.32 255.255.255.224
dns-server 199.10.10.37
domain-name gemini.com
default-router 199.10.10.33
```

```
ip dhcp pool RECEPTIONPOOL
network 199.10.10.64 255.255.255.224
dns-server 199.10.10.37
domain-name gemini.com
default-router 199.10.10.65

ip dhcp pool HRPOOL
network 199.10.10.96 255.255.255.224
dns-server 199.10.10.37
domain-name gemini.com
default-router 199.10.10.97

ip dhcp pool GADPOOL
network 199.10.10.128 255.255.255.224
dns-server 199.10.10.37
domain-name gemini.com
default-router 199.10.10.129

ip dhcp pool SALESPOOL
network 199.10.10.160 255.255.255.224
dns-server 199.10.10.37
domain-name gemini.com
default-router 199.10.10.161

ip dhcp pool MARKETINGPOOL
network 199.10.10.192 255.255.255.224
dns-server 199.10.10.37
domain-name gemini.com
default-router 199.10.10.193

ip dhcp pool GAMEDEVPOOL
network 199.10.10.224 255.255.255.224
dns-server 199.10.10.37
domain-name gemini.com
default-router 199.10.10.225

ip dhcp pool LEISUREPOOL
network 199.10.11.0 255.255.255.240
dns-server 199.10.10.37
domain-name gemini.com
default-router 199.10.11.1

ip dhcp pool MGMTPOOL
network 199.10.11.16 255.255.255.240
dns-server 199.10.10.37
domain-name gemini.com
default-router 199.10.11.17

ip dhcp pool VOICE
network 199.10.11.32 255.255.255.240
```

```
dns-server 199.10.10.37
domain-name gemini.com
default-router 199.10.11.33

int f0/0
no shut

int f0/0.10
encap dot1Q 10
ip add 199.10.10.34 255.255.255.224
standby 1 ip 199.10.10.33
standby 1 priority 105
standby 1 preempt
standby 1 track s0/0/1

int f0/0.20
encap dot1Q 20
ip add 199.10.10.66 255.255.255.224
standby 1 ip 199.10.10.65
standby 1 priority 105
standby 1 preempt
standby 1 track s0/0/1

int f0/0.30
encap dot1Q 30
ip add 199.10.10.98 255.255.255.224
standby 1 ip 199.10.10.97
standby 1 priority 105
standby 1 preempt
standby 1 track s0/0/1

int f0/0.40
encap dot1Q 40
ip add 199.10.10.130 255.255.255.224
standby 1 ip 199.10.10.129
standby 1 priority 105
standby 1 preempt
standby 1 track s0/0/1

int f0/0.50
encap dot1Q 50
ip add 199.10.10.162 255.255.255.224
standby 1 ip 199.10.10.161
standby 1 priority 105
standby 1 preempt
standby 1 track s0/0/1

int f0/0.60
encap dot1Q 60
ip add 199.10.10.194 255.255.255.224
```

```
standby 1 ip 199.10.10.193
standby 1 priority 105
standby 1 preempt
standby 1 track s0/0/1

int f0/0.70
encap dot1Q 70
ip add 199.10.10.226 255.255.255.224
standby 1 ip 199.10.10.225
standby 1 priority 105
standby 1 preempt
standby 1 track s0/0/1

int f0/0.80
encap dot1Q 80
ip add 199.10.11.2 255.255.255.240
standby 1 ip 199.10.11.1
standby 1 priority 105
standby 1 preempt
standby 1 track s0/0/1

int f0/0.99
encap dot1Q 99
ip add 199.10.11.18 255.255.255.240
standby 1 ip 199.10.11.17
standby 1 priority 105
standby 1 preempt
standby 1 track s0/0/1

int f0/0.150
encap dot1Q 150
ip add 199.10.11.34 255.255.255.240
standby 1 ip 199.10.11.33
standby 1 priority 105
standby 1 preempt
standby 1 track s0/0/1

int se0/0/1
ip add 10.10.10.5 255.255.255.252

telephony-service
ip source-address 199.10.10.33 port 2000
max-dn 16
max-ephone 16
auto assign 1 to 16

ephone-dn 1
number 1001
ephone-dn 2
number 1002
```

```
ephone-dn 3
number 1003
ephone-dn 4
number 1004
ephone-dn 5
number 1005
ephone-dn 6
number 1006
ephone-dn 7
number 1007
ephone-dn 8
number 1008
ephone-dn 9
number 1009
ephone-dn 10
number 1010
ephone-dn 11
number 1011
ephone-dn 12
number 1012
ephone-dn 13
number 1013
ephone-dn 14
number 1014
ephone-dn 15
number 1015
ephone-dn 16
number 1016

router ospf 1
network 199.10.10.32 255.255.255.224 area 1
network 199.10.10.64 255.255.255.224 area 1
network 199.10.10.96 255.255.255.224 area 1
network 199.10.10.128 255.255.255.224 area 1
network 199.10.10.160 255.255.255.224 area 1
network 199.10.10.192 255.255.255.224 area 1
network 199.10.10.224 255.255.255.224 area 1
network 199.10.11.0 255.255.255.224 area 1
network 199.10.11.16 255.255.255.224 area 1
network 199.10.11.32 255.255.255.224 area 1
redistribute eigrp 10 metric 1 subnets tag 22

router eigrp 10
network 10.10.10.4 0.0.0.3
redistribute ospf 1 metric 1000000 10 255 1 1500

!-- BACKUP ROUTER
ena
conf t
hostname CEBU_BCKUPRTR
```

```
banner motd $warning! unauthorized access is prohibited!$
enable secret cisco
service password-encryption
line con 0
password cisco
login authentication MAINBRANCH_BACKUP
line vty 0 4
pass cisco
login authentication MAINBRANCH_BACKUP
transport input ssh

aaa new-model
aaa authentication login MAINBRANCH_BACKUP group radius local
aaa accounting exec default start-stop group radius

radius server MAINBRANCH_BACKUP
address ipv4 199.10.10.37 auth-port 1645
key radiuspa55

ip domain-name gemini.com
crypto key generate rsa general-keys mod 1024
ip ssh version 2
username admin password cisco

ip dhcp excluded-address 199.10.10.33 199.10.10.43
ip dhcp excluded-address 199.10.10.65 199.10.10.75
ip dhcp excluded-address 199.10.10.97 199.10.10.107
ip dhcp excluded-address 199.10.10.129 199.10.10.139
ip dhcp excluded-address 199.10.10.161 199.10.10.171
ip dhcp excluded-address 199.10.10.193 199.10.10.203
ip dhcp excluded-address 199.10.10.225 199.10.10.235
ip dhcp excluded-address 199.10.11.1 199.10.11.10
ip dhcp excluded-address 199.10.11.17 199.10.11.27
ip dhcp excluded-address 199.10.11.33 199.10.11.43

ip dhcp pool ITPOOL
network 199.10.10.32 255.255.255.224
dns-server 199.10.10.37
domain-name gemini.com
default-router 199.10.10.33

ip dhcp pool RECEPTIONPOOL
network 199.10.10.64 255.255.255.224
dns-server 199.10.10.37
domain-name gemini.com
default-router 199.10.10.65

ip dhcp pool HRPOOL
network 199.10.10.96 255.255.255.224
dns-server 199.10.10.37
```

```
domain-name gemini.com
default-router 199.10.10.97

ip dhcp pool GADPOOL
network 199.10.10.128 255.255.255.224
dns-server 199.10.10.37
domain-name gemini.com
default-router 199.10.10.129

ip dhcp pool SALESPOOL
network 199.10.10.160 255.255.255.224
dns-server 199.10.10.37
domain-name gemini.com
default-router 199.10.10.161

ip dhcp pool MARKETINGPOOL
network 199.10.10.192 255.255.255.224
dns-server 199.10.10.37
domain-name gemini.com
default-router 199.10.10.193

ip dhcp pool GAMEDEVPOOL
network 199.10.10.224 255.255.255.224
dns-server 199.10.10.37
domain-name gemini.com
default-router 199.10.10.225

ip dhcp pool LEISUREPOOL
network 199.10.11.0 255.255.255.240
dns-server 199.10.10.37
domain-name gemini.com
default-router 199.10.11.1

ip dhcp pool MGMTPOOL
network 199.10.11.16 255.255.255.240
dns-server 199.10.10.37
domain-name gemini.com
default-router 199.10.11.17

ip dhcp pool VOICE
network 199.10.11.32 255.255.255.240
dns-server 199.10.10.37
domain-name gemini.com
default-router 199.10.11.33

int f0/0
no shut

int f0/0.10
encap dot1Q 10
```

```
ip add 199.10.10.35 255.255.255.224
standby 1 ip 199.10.10.33
standby 1 preempt

int f0/0.20
encap dot1Q 20
ip add 199.10.10.67 255.255.255.224
standby 1 ip 199.10.10.65
standby 1 preempt

int f0/0.30
encap dot1Q 30
ip add 199.10.10.99 255.255.255.224
standby 1 ip 199.10.10.97
standby 1 preempt

int f0/0.40
encap dot1Q 40
ip add 199.10.10.131 255.255.255.224
standby 1 ip 199.10.10.129
standby 1 preempt

int f0/0.50
encap dot1Q 50
ip add 199.10.10.163 255.255.255.224
standby 1 ip 199.10.10.161
standby 1 preempt

int f0/0.60
encap dot1Q 60
ip add 199.10.10.195 255.255.255.224
standby 1 ip 199.10.10.193
standby 1 preempt

int f0/0.70
encap dot1Q 70
ip add 199.10.10.227 255.255.255.224
standby 1 ip 199.10.10.225
standby 1 preempt

int f0/0.80
encap dot1Q 80
ip add 199.10.11.3 255.255.255.240
standby 1 ip 199.10.11.1
standby 1 preempt

int f0/0.99
encap dot1Q 99
ip add 199.10.11.19 255.255.255.240
standby 1 ip 199.10.11.17
```

```
standby 1 preempt

int f0/0.150
encap dot1Q 150
ip add 199.10.11.35 255.255.255.240
standby 1 ip 199.10.11.33
standby 1 preempt

int se0/0/1
ip add 11.11.11.5 255.255.255.252

telephony-service
ip source-address 199.10.10.33 port 2000
max-dn 16
max-ephone 16
auto assign 1 to 16

ephone-dn 1
number 1001
ephone-dn 2
number 1002
ephone-dn 3
number 1003
ephone-dn 4
number 1004
ephone-dn 5
number 1005
ephone-dn 6
number 1006
ephone-dn 7
number 1007
ephone-dn 8
number 1008
ephone-dn 9
number 1009
ephone-dn 10
number 1010
ephone-dn 11
number 1011
ephone-dn 12
number 1012
ephone-dn 13
number 1013
ephone-dn 14
number 1014
ephone-dn 15
number 1015
ephone-dn 16
number 1016
```

```
router ospf 1
network 199.10.10.32 255.255.255.224 area 1
network 199.10.10.64 255.255.255.224 area 1
network 199.10.10.96 255.255.255.224 area 1
network 199.10.10.128 255.255.255.224 area 1
network 199.10.10.160 255.255.255.224 area 1
network 199.10.10.192 255.255.255.224 area 1
network 199.10.10.224 255.255.255.224 area 1
network 199.10.11.0 255.255.255.224 area 1
network 199.10.11.16 255.255.255.224 area 1
network 199.10.11.32 255.255.255.224 area 1
redistribute eigrp 10 metric 1 subnets tag 22

router eigrp 10
network 11.11.11.4 0.0.0.3
redistribute ospf 1 metric 1000000 10 255 1 1500

do wr memory

!-- MLS 1
ena
conf t
hostname CEBU_MLS1
banner motd $warning! unauthorized access is prohibited!$
enable secret cisco
service password-encryption
line con 0
password cisco
login
line vty 0 4
pass cisco
login local
transport input ssh

ip domain-name gemini.com
crypto key generate rsa general-keys mod 1024
ip ssh version 2
username admin password cisco

vtp domain gemini.com
vtp mode server

vlan 10
name IT
vlan 20
name RECEPTION
vlan 30
name HR
vlan 40
name GAD
```

```
vlan 50
name SALES
vlan 60
name MARKETING
vlan 70
name GAMEDEV
vlan 80
name LEISURE
vlan 99
name MGMT
vlan 150
name VOICE

int vlan99
ip add 199.10.11.19 255.255.255.240
no shut

int fa0/22
sw trunk encapsulation dot1q
sw mode trunk
sw trunk all vlan 1-1000

int ra fa0/1-13
shut

int ra g0/1-2
channel-group 1 mode active

int ra fa0/20-21
channel-group 2 mode auto

int ra fa0/23-24
channel-group 3 mode active

int ra fa0/17-18
channel-group 4 mode active

int ra fa0/15-16
channel-group 5 mode active

int fa0/14
sw mode access
sw access vlan 99

int f0/19
sw mode access
sw access vlan 10

int po1
switchport trunk encapsulation dot1q
```

```
sw mode trunk
sw trunk all vlan 1-1000

int po2
switchport trunk encapsulation dot1q
sw mode trunk
sw trunk all vlan 1-1000

int po3
switchport trunk encapsulation dot1q
sw mode trunk
sw trunk all vlan 1-1000

int po4
switchport trunk encapsulation dot1q
sw mode trunk
sw trunk all vlan 1-1000

int po5
switchport trunk encapsulation dot1q
sw mode trunk
sw trunk all vlan 1-1000

!-- MLS2
ena
conf t
hostname CEBU_MLS2
banner motd $warning! unauthorized access is prohibited!$
enable secret cisco
service password-encryption
line con 0
password cisco
login
line vty 0 4
pass cisco
login local
transport input ssh

ip domain-name gemini.com
crypto key generate rsa general-keys mod 1024
ip ssh version 2
username admin password cisco

vtp domain gemini.com
vtp mode client

int vlan99
ip add 199.10.11.20 255.255.255.240
no shut
```

```
int fa0/22
sw trunk encapsulation dot1q
sw mode trunk
sw trunk all vlan 1-1000

int ra fa0/1-17
shut

int ra g0/1-2
channel-group 1 mode passive

int ra fa0/20-21
channel-group 2 mode active

int ra fa0/23-24
channel-group 3 mode auto

int ra fa0/18-19
channel-group 4 mode active

int po1
switchport trunk encapsulation dot1q
sw mode trunk
sw trunk all vlan 1-1000

int po2
switchport trunk encapsulation dot1q
sw mode trunk
sw trunk all vlan 1-1000

int po3
switchport trunk encapsulation dot1q
sw mode trunk
sw trunk all vlan 1-1000

int po4
switchport trunk encapsulation dot1q
sw mode trunk
sw trunk all vlan 1-1000

!-- RECEPTION SWITCH
ena
conf t
hostname RECEPTION_SW
banner motd $warning! unauthorized access is prohibited!$
enable secret cisco
service password-encryption
line con 0
password cisco
login
```

```
line vty 0 4
pass cisco
login local
transport input ssh

ip domain-name gemini.com
crypto key generate rsa general-keys mod 1024
ip ssh version 2
username admin password cisco

vtp domain gemini.com
vtp mode client

int vlan99
ip add 199.10.10.21 255.255.255.240
no shut

int ra fa0/1-8
sw mode access
sw access vlan 20
sw voice vlan 150

sw port-security
sw port-security maximum 3
sw port-security violation restrict
sw port-security mac-address sticky

int ra g0/1-2
channel-group 1 mode on

int ra fa0/23-24
channel-group 2 mode desirable

int po1
sw mode trunk
sw trunk all vlan 1-1000

int po2
sw mode trunk
sw trunk all vlan 1-1000

!-- IT SWITCH
ena
conf t
hostname IT_SW
banner motd $warning! unauthorized access is prohibited!$
enable secret cisco
service password-encryption
line con 0
password cisco
```

```
login
line vty 0 4
pass cisco
login local
transport input ssh

ip domain-name gemini.com
crypto key generate rsa general-keys mod 1024
ip ssh version 2
username admin password cisco

vtp domain gemini.com
vtp mode client

int vlan99
ip add 199.10.10.22 255.255.255.240
no shut

int ra fa0/1-8
sw mode access
sw access vlan 10
sw voice vlan 150

sw port-security
sw port-security maximum 3
sw port-security violation restrict
sw port-security mac-address sticky

int ra g0/1-2
channel-group 1 mode on

int ra fa0/23-24
channel-group 3 mode passive

int po1
sw mode trunk
sw trunk all vlan 1-1000

int po3
sw mode trunk
sw trunk all vlan 1-1000

!-- HR SWITCH
ena
conf t
hostname HR_SW
banner motd $warning! unauthorized access is prohibited!$
enable secret cisco
service password-encryption
line con 0
```

```
password cisco
login
line vty 0 4
pass cisco
login local
transport input ssh

ip domain-name gemini.com
crypto key generate rsa general-keys mod 1024
ip ssh version 2
username admin password cisco

vtp domain gemini.com
vtp mode client

int vlan99
ip add 199.10.10.23 255.255.255.240
no shut

int ra fa0/1-8
sw mode access
sw access vlan 30
sw voice vlan 150

sw port-security
sw port-security maximum 3
sw port-security violation restrict
sw port-security mac-address sticky

int ra g0/1-2
channel-group 2 mode on

int ra fa0/23-24
channel-group 4 mode passive

int po2
sw mode trunk
sw trunk all vlan 1-1000

int po4
sw mode trunk
sw trunk all vlan 1-1000

!-- GAD SWITCH
ena
conf t
hostname GAD_SW
banner motd $warning! unauthorized access is prohibited!$
enable secret cisco
service password-encryption
```

```
line con 0
password cisco
login
line vty 0 4
pass cisco
login local
transport input ssh

ip domain-name gemini.com
crypto key generate rsa general-keys mod 1024
ip ssh version 2
username admin password cisco

vtp domain gemini.com
vtp mode client

int vlan99
ip add 199.10.10.24 255.255.255.240
no shut

int ra fa0/1-8
sw mode access
sw access vlan 40
sw voice vlan 150

sw port-security
sw port-security maximum 3
sw port-security violation restrict
sw port-security mac-address sticky

int ra g0/1-2
channel-group 2 mode on

int ra fa0/23-24
channel-group 5 mode passive

int po2
sw mode trunk
sw trunk all vlan 1-1000

int po5
sw mode trunk
sw trunk all vlan 1-1000

!-- MARKETING SWITCH
ena
conf t
hostname MARKETING_SW
banner motd $warning! unauthorized access is prohibited!$
enable secret cisco
```

```
service password-encryption
line con 0
password cisco
login
line vty 0 4
pass cisco
login local
transport input ssh

ip domain-name gemini.com
crypto key generate rsa general-keys mod 1024
ip ssh version 2
username admin password cisco

vtp domain gemini.com
vtp mode client

int vlan99
ip add 199.10.10.25 255.255.255.240
no shut

int ra fa0/1-8
sw mode access
sw access vlan 60
sw voice vlan 150

sw port-security
sw port-security maximum 3
sw port-security violation restrict
sw port-security mac-address sticky

int ra g0/1-2
channel-group 1 mode on

int ra fa0/23-24
channel-group 2 mode passive

int po1
sw mode trunk
sw trunk all vlan 1-1000

int po2
sw mode trunk
sw trunk all vlan 1-1000

!-- SALES SWITCH
ena
conf t
hostname SALES_SW
banner motd $warning! unauthorized access is prohibited!$
```

```
enable secret cisco
service password-encryption
line con 0
password cisco
login
line vty 0 4
pass cisco
login local
transport input ssh

ip domain-name gemini.com
crypto key generate rsa general-keys mod 1024
ip ssh version 2
username admin password cisco

vtp domain gemini.com
vtp mode client

int vlan99
ip add 199.10.10.26 255.255.255.240
no shut

int ra fa0/1-8
sw mode access
sw access vlan 50
sw voice vlan 150

sw port-security
sw port-security maximum 3
sw port-security violation restrict
sw port-security mac-address sticky

int ra g0/1-2
channel-group 1 mode on

int ra fa0/23-24
channel-group 4 mode passive

int po1
sw mode trunk
sw trunk all vlan 1-1000

int po4
sw mode trunk
sw trunk all vlan 1-1000

!-- GAMEDEV & LEISURE SWITCH
ena
conf t
hostname GAMEDEV&LEISURE_SW
```

```
banner motd $warning! unauthorized access is prohibited!$
enable secret cisco
service password-encryption
line con 0
password cisco
login
line vty 0 4
pass cisco
login local
transport input ssh

ip domain-name gemini.com
crypto key generate rsa general-keys mod 1024
ip ssh version 2
username admin password cisco

vtp domain gemini.com
vtp mode client

int vlan99
ip add 199.10.10.27 255.255.255.240
no shut

int ra fa0/1-8
sw mode access
sw access vlan 70
sw voice vlan 150

int ra fa0/9-16
sw mode access
sw access vlan 80
sw voice vlan 150

sw port-security
sw port-security maximum 3
sw port-security violation restrict
sw port-security mac-address sticky

int ra g0/1-2
channel-group 3 mode desirable

int po3
sw mode trunk
sw trunk all vlan 1-1000
```

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