ConnectEZ - Online virtual phone system

Software Requirements Specification

1.0.0

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Team COSMOS

Revision History

Date	Description	Author	Comments
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1. Introduction

The introduction of the Software Requirement Specification (SRS) is a meticulously crafted document that serves as the foundational blueprint for the development of the ConnectEZ, Online Virtual Phone System. This section outlines the purpose, scope, definitions, acronyms, abbreviations, references, and overview of the SRS. This comprehensive document outlines the user characteristics, any assumptions considered, precise functional and non-functional requirements, architectural design, and user-centric features of the system. It is intended to guide the development team, stakeholders, and all concerned parties in a clear and structured manner.

1.1Purpose

The aim of this document is to gather and analyze various ideas related to defining the system and its requirements for consumers. Additionally, we will predict and organize potential uses for the product to gain a better understanding of the project. We will also outline concepts that may be developed later and document ideas that are being considered but may not make the final cut as the product evolves.

In summary, the purpose of this SRS document is to provide a detailed overview of our software product, including its parameters and goals. The document outlines the project's target audience and user interface, hardware, and software requirements. It defines how our client, team, and audience perceive the product and its functionality and serves as a helpful tool for designers and developers to assist in the software development lifecycle (SDLC) processes.

1.2 Definitions, Acronyms, and Abbreviations

T3	A type of data connection capable of transmitting a digital signal at 44Mbps.
HTML	*Hypertext Markup Language*
CSS	*Cascading Style Sheets*
TCP/IP	Transmission Control Protocol/Internet Protocol
HTTP	Hypertext Transfer Protocol
CRUD	Create/Read/Update/Delete
DFDs	Data flow diagrams
SDLC	Software Development Life Cycle

1.3 References

- This section provides a list of resources that aided the process of writing the Software Requirement Specification document.

1. *Michigan State University. (2009). IEEE SRS Template. Retrieved from https://www.cse.msu.edu/~cse870/IEEEXplore-SRS-template.pdf*
2. *Microsoft. (n.d.). Introduction to Mobile SDLC. Microsoft Learn. [https://learn microsoft.com/en-us/xamarin/cross-platform/get-started/introduction-to-mobile-sdlc]*

2. General Description

This section of the SRS provides a broad overview of the ConnectEZ application, offering essential context and insight into the user's characteristics and assumptions and any additional dependencies. It is important to note that this section does not present specific requirements but serves as a foundation for a deeper understanding of the subsequent detailed requirements.

2.1 User Characteristics

The ConnectEZ application is designed to cater to a diverse user base, including individuals, small businesses, and large enterprises. Users may vary in technical proficiency, ranging from novice to experienced technology users. Users of the application may possess varying educational backgrounds, ranging from basic to advanced levels.
Therefore, the application should offer a user-friendly interface and clear instructions for less tech-savvy users while providing advanced features for those who require them. Recognizing these distinctions informs the system's design, ensuring it caters to the diverse needs and expectations of our user base.

2.2 Assumptions and Dependencies

This subsection of the SRS is dedicated to identifying and documenting the various factors, assumptions, and dependencies that can influence the requirements specified within the document.

Assumptions:

1. **Operating System Availability**: We assume that the designated hardware for the ConnectEZ application will be compatible with the specified operating system. Any unavailability or changes in the operating system may require adjustments to the software to ensure compatibility.
2. **Internet Connectivity**: It is assumed that users will have reliable internet connectivity to access the ConnectEZ application. Any significant fluctuations or disruptions in internet connectivity may impact the application's performance and may require adaptations in response.
3. **User Device Compatibility**: We assume that user devices (e.g., smartphones, laptops) meet the application's minimum requirements for compatibility. Changes in user devices or their capabilities may necessitate modifications to the application to ensure seamless operation.

Dependencies:

1. **Third-Party Services**: The ConnectEZ application may rely on third-party services (e.g., cloud-based infrastructure, payment gateways). Changes or disruptions in these external services may affect the application's functionality and require adjustments to maintain service continuity.
2. **Regulatory Compliance**: Compliance with relevant telecommunications regulations and data privacy laws is essential. Any changes in applicable regulations or legal requirements may necessitate updates to the application's features and data handling processes.

3. **Hardware Availability**: Dependencies on specific hardware components are crucial. Changes in hardware availability or specifications may require adaptations to the application to ensure proper functionality.

These assumptions and dependencies serve as crucial contextual information, helping to anticipate potential challenges and guiding future adjustments to the ConnectEZ application as needed. As the project progresses, any alterations to these factors will be carefully considered to maintain the integrity and effectiveness of ConnectEZ.

3. Specific Requirements

This section breaks down the specific requirements into functional and non-functional requirements. Functional requirements explain what the system should do, and Non-functional requirements state the constraints within which the system should operate.

3.1 Functional Requirements

This sub-section includes all the major functionalities and systems this project would require achieving the main objective of the project.

3.1.1 System Structure

- The system shall allow users to make voice and video calls.
- The system shall have apps on various platforms including Windows, macOS, iOS, and Android.
- The apps shall have a user interface to allow users to interact with the system.
- The system shall allow client-server communication over sockets.
- The system shall be connected to the client apps via an IP network.
- The system shall allow user data to be stored in data centers for synchronization across devices.

3.1.1.1 Server Design

- The server shall handle user authentication and login requests.
- The server shall verify user credentials upon signing in.
- The server shall manage the online/offline status of the user.
- The server shall manage the availability of the user.
- The server shall manage the contact list of the user including CRUD functionalities.
- The server shall help establish and maintain audio and video connections.

3.1.2 Basic Call Processing

- The call processing system shall allow users to send and receive calls.
- The call processing system shall monitor each client for events, such as dialing a number.
- The call processing system shall establish an audio connection upon a successful call.
- The call processing system shall terminate the audio connection when either the sender or receiver hangs up.
- The call processing server shall check for the validity of the dialed number, to ensure that it has the correct format and belongs to an active user or phone number in the system.

- The server shall send an error response to the caller's app if the dialed number is invalid or unreachable.
- The server shall maintain a log of all call activities including call start times, call durations, and participants.
- The client app shall allow users to access their call history.
- The call processing system shall handle call busy, call reject, call timeout, call cancel, and error handling depending on the situation.
- The call processing system shall provide an option to leave a voicemail message if a call goes unanswered.

3.1.3 Dialing Plan

- The dialing system shall construct and maintain a mapping from dialed numbers to (IP address, port) pairs.
- The dialing system shall translate the numbers dialed by a user, using the mapping from numbers to (IP, port) pairs.
- The mapping shall be accessible to the call processing software and the system console (software handling the administration).
- The dialing system shall have a clear conflict resolution strategy to determine the priority of the request from the call processing and the system console.
- The dialing system shall have a caching mechanism to improve access speed and reduce load on the database.
- The dialing system shall cache frequently accessed mapping for quick retrieval.
- The dialing system shall ensure cache consistency with the database to avoid data inconsistencies.

3.1.4 Administrative System Console (Desktop Only)

- The system console shall let every administrator access all its features.
- The system console shall allow only one administrator at a time.
- The system console shall be easier to extend if we were to accommodate multiple administrators at a time.
- The system console shall check every input provided by the administrator to ensure that it does not cause any inconsistencies in the system database.

3.1.5 User Accounts Management

- The system console shall find an unassigned number, and an available IP address and associate the number with an IP address when a user is added.
- The system shall provide 'originate' and 'receive' call privileges to each user account.
- The system shall implement filters to manage the privileges.
- The system shall disassociate the IP from the number and disassociate both from the user account when a user cancels the phone service.
- The system shall retain the user records indefinitely.

3.1.6 Load Balancing

- The system console (administrative system) shall allow setting a value for the maximum number of calls.

- The load balancing system shall verify that the maximum number of calls has not been exceeded when a user tries to place a call.
- The load balancing system shall keep track of the number of calls happening at a time.

3.1.7 Billing System

- The billing system shall determine the cost of the call based on the number dialed, the duration of the call, and when the call was established.
- The billing system shall keep a record of every call established, where the record includes the caller, the destination phone number, and the duration of the call.
- The billing system shall send a bill to each user every month.
- The system console shall display a user's bill for any billing period.
- The bill shall show the information about each call including the number dialed, day, time, duration, tariff per minute, and charges of the call.
- The bill shall show the total charges of the calls and the sum of all charges incurred during the relevant billing period.
- The billing system shall issue a bill to each user who has an outstanding balance after the end of every billing cycle.
- The billing system shall issue a bill immediately if the user has canceled the service.
- The system console shall record the bill payments.
- The billing system shall include a warning in the next bill if the user fails to make a payment.
- The system console shall allow the administration to cancel or suspend a user's service if the user fails to pay the bill.
- The system console shall allow the administration to change amounts charged for calls by adding new plans or by editing existing ones.
- The system console shall allow the administration to change the plan that a user is subscribed to.
- The billing plan shall specify the regular charge rate for calls, one or more periods, and the discount rate for each of the periods.
- The billing system shall ensure that the dates and times of the discount periods do not overlap.
- The billing system shall ensure that the changes to the user's billing plan are effective immediately

3.2 Non-Functional Requirements

This sub-section covers the metrics that are used to specify the properties and constraints of the system.

3.2.1 Performance

- The product shall take initial load time depending on internet connection strength and the load times shall be less than 5 seconds for more than 95% of users.
- The system shall respond to the user within 2 seconds for all typical operations.
- The system shall handle a minimum of 100 concurrent calls without any performance degradation.
- The system shall ensure clear audio quality with no distortion or delay for all calls.

- The system shall ensure that at least 95% of all transactions are processed in less than a second.

3.2.2 Reliability

- The system shall provide RAID V DISK Stripping on all database storage disks.
- The system shall have at least a 95% uptime rate to ensure call-making and receiving consistently.
- The system shall regularly back up user call records and system data every 24 hours.
- The system shall provide user-friendly error messages to both technical and non-technical users for easy understanding.

3.2.3 Availability

- The system shall provide a contractual agreement with an internet service provider for T3 access with 99.9999% availability.
- User support systems shall be available 24/7 to resolve technical issues.
- The system maintenance hours shall be scheduled during non-peak hours to minimize disruption (e.g., 12:00 a.m. ~ 1:00 a.m.).

3.2.4 Security

- The system shall use secure sockets in all transactions that include any confidential customer information.
- The system shall automatically log out all customers after an hour of inactivity.
- Access to the system console shall be restricted to authorized personnel only.
- All the user activities shall be recorded and stored for security every hour.
- Users shall be asked to use a strong and unique username and password to access the system.

3.2.5 Interfaces

3.2.5.1 User Interfaces

- The user interface for the system shall be compatible with different platforms such as web browsers (Google Chrome, Microsoft Edge, Safari, etc.), and mobile applications (IOS, Android) to allow users to access from both desktop and mobile devices.
- The user interfaces shall be implemented using web technologies (HTML, CSS, JavaScript) for web browsers and Java and Swift for applications.

3.2.5.2 Software Interfaces

- The system shall communicate with the billing system to record, and process call charges.
- The system shall communicate with the user account management module to manage user accounts.
- The system shall communicate with CRM (Customer Relationship Management) to provide customer support.
- The system shall communicate with the call recording system for quality assurance purposes.

- The system shall communicate with the external Tax system to calculate tax.

3.5.2.3 Communications Interfaces

- The system shall utilize the TCP/IP protocol suite to ensure reliable communication throughout the system.
- The system shall utilize the HTTP protocol for internet-based communication.
- The system shall employ the WebSocket protocol to facilitate efficient and responsive network communication among its various components.

3.3 Design Constraints

- The following design constraints will guide the development process and ensure the system meets specific criteria.

3.3.1 Cross-Platform Compatibility

- The online virtual phone system must be compatible with desktop and mobile platforms, including Android and iOS, ensuring a seamless user experience across different devices.

3.3.2 Network Connectivity

- Specify the minimum requirements for network speed and stability to ensure reliable performance, especially for real-time communication.

3.3.3 Responsive Design

- The user interface should be responsive and adapt to various screen sizes and resolutions to provide an optimal viewing and interaction experience on both desktop and mobile devices.

3.3.4 Minimum System Requirements

- Define the minimum hardware and software requirements for running the application.

3.3.5 User Accessibility

- Ensure that the application adheres to accessibility standards to accommodate users with disabilities. This includes providing keyboard navigation or screen readers among other features.

3.3.6 Backup and Recovery

- Implement robust backup and recovery mechanisms to protect against data loss.

3.3.7 User Authentication and Authorization

- Define the secure login processes and user role management, to control overall access to the system features.

3.4 Legal, Copyright, and Other Notices

- **Copyright information** - The organization is the copyright holder of the software.

- **Open-source components –** List of open-source components and third-party libraries that are used by the software
- **Compliance with law –** States that the software must be used in compliance with applicable laws and regulations.

3.5 Other Requirements

- **Comprehensive Documentation –** Documentation that provides a lot of information for the users and administrators.
- **Video Conferencing and Chatting –** A functional requirement that allows users to send messages and see each other. (This is not a primary requirement, but can be added if there are available resources)
- **Reporting –** A functional requirement that allows users to report another user for inappropriate behavior.

4 Other Supporting Documents

- **The Project Charter** – An approved document that states the goals of the project
- **Legal and Compliance Documentation** – Lists all the legal requirements and industry standards.
- **Prototypes and Data Flow Diagrams –** Prototypes show how the application will look from the user's perspective and DFDs are used to understand how data flows through the system.
- **User stories** – A list of descriptions of how users will interact with the virtual phone system.

A. Appendices

The documents below provide additional information that supports the main content of this document.

- Notes from meetings with the stakeholders
- Sketches and Prototypes created by the developers
- A list of technical terms, acronyms, and abbreviations