

Bandwidth Connector

Final Project Report

Final Requirements, Design, Implementation/Testing & Installation/Delivery

Bandwidth

CSC 492 Team 10

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1. Executive Summary

In today's world, there are many different services for communication. A single person can have a Skype account, Google Chat account, cell phone number, and various other accounts for different methods of communication. Bandwidth wants to set up a system where a user can easily get ahold of someone no matter which services they are using. The idea is to create a unique URL that will contact a user on all of their different accounts and phone numbers so that someone can easily get ahold of them. The URL also needs to be simple and easy to remember, which will be much easier than trying to remember everyone's phone numbers, Skype names, Google names, etc. When a user tries calling someone using their URL, the Connector system will try calling each device that the person has activated until they answer. For instance, if they don't answer on their browser, Connector will automatically try calling them on their cell phone. This abstracts users away from what device they are actually calling and makes people easier to contact.

We decided to use a Vert.x web server to power the Connector system. Each user that connects to the server gets a WebSocket connection which allows easy communication between the client and server. When one user wants to call another, the server sends the metadata required for a WebRTC connection over the WebSocket connection. After the connection is created, the server is no longer needed for keeping the connection alive. For instance, if the server were to go down, the call between the two users would not be affected. All of our user information is stored in a MongoDB database. We chose Mongo because it can store JSON objects directly, which works well with our JavaScript-everywhere approach.

The team has finished adding all of the main features that were required for the project. We have set up WebRTC chat, user registration, and have worked on the edge cases involved in making calls. Users have the ability to call anonymously without having to log into the system. The team has also added the functionality for calling a phone using a browser and vice versa. The Connector system uses Bandwidth's gateway to enable audio communication between a browser and phone using WebRTC. The system allows for users to enter multiple phone numbers and to prioritize them. The Connector system then automatically tries calling them at each different device in the order they specified until they answer or decline. Integrating into other systems such as Skype and Google Chat were out of the scope of the project - they were just examples for how such a system would be useful.

2. Problem Description

Sponsor Background

Bandwidth is a Telecom company that puts innovation first. They look at the current way that things are done and try to find a new and innovative way to meet people's needs. Bandwidth has an VoIP network that serves millions of phone numbers nationwide. Bandwidth hosts All-Night-Hack-A-Thons and Big Idea competitions where they try to introduce new and innovative

ideas and try to think ahead for the future. Everyone at Bandwidth has a voice, and the company encourages an environment for change and the development of exciting new products. The Bandwidth Co-founder and CEO, David Morken, was named Young Southeast Area Entrepreneur of the year. Entrepreneur magazine recognizes Bandwidth as a 'disruptor', meaning that they are known for breaking new ground and disrupting the norms of the current industry.

Problem Statement

Bandwidth's proposed software is a real-time communication system using WebRTC. The idea is to replace phone numbers and other identifiers with a single URL. There is a need for this project because with all new communication services, there are so many different contact ids one has to keep track of. This system would consolidate all of those contacts into a single URL. This system will allow someone to navigate to a specialized URL and it will call the person registered to that URL. The system will try contacting them through the web if they are online, or through other services if they are offline, such as their phone. This new system will bring simplicity to communication.

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Project Goals and Benefits

- Set up a web based communication system
- Integrate communication system with Bandwidth VoIP API
- Enable browser to phone communication
- Allow easy communication between people
- Allow users to use one address for all communication services
- Integrate with multiple methods of communication using one service

Development Methodology

The development methodology that we are using is agile scrum. We have 2 week sprints and we meet with the sponsors every Thursday to report on our current progress and make sure we are heading in the right direction. We have a total of 6 sprints over the course of the semester.

The first sprint involved quite a bit of design and getting used to WebRTC and how it works. We had to setup a local WebRTC where you can see yourself using your own webcam. The second sprint involved peer-to-peer connection using WebRTC. It also encompassed "naked" URL calling, which is calling someone by entering in their unique URL. To do this, we also had to set up user registration. The third sprint was a bit smaller because it was during

break. This required us to setup a directory display which shows a list of registered users that are in the system. We included a profile view page where users can see their current profile information. We also had to handle all of the edge cases associated with video calling, such as calling someone that isn't online and how to handle that. Sprint four involved polishing up the web based services before we integrate with Bandwidth's VoIP API. This meant allowing full profile management, including viewing data from the directory, and adding some functionality common in chat clients, such as the ability to mute audio. Sprints five and six were spent integrating our current system with Bandwidth's VoIP API. We added functionality for users to call between browsers and phones, and the automatic failover if they didn't answer on the first device. We allowed users to give each phone number a priority, with the highest priority phone being called first. If the user misses the call on the first phone, the system automatically calls the phone with the next highest priority.

Challenges

- Setting up MongoDB
 - Vert.x didn't have any good plugins for MongoDB. The plugin that was available was poorly documented and was hard to follow. It didn't have any connection options in the documentation and we had to look at the plugin code itself in order to figure them out. This required research to find the plugin in the first place because it was so obscure, and then some experimentation to get it working.
- Setting up a templating system
 - Vert.x doesn't natively support templating. We decided on using mustache.js for templating. There was node.js support for mustache.js, along with a lot of other languages, but Vert.x didn't have any support. We had to create our own plugin for it to get it working.
- Integrating with the SPIDR API and Genband Gateway
 - By far the hardest part of the project, integrating our currently existing WebRTC solution with Bandwidth's SPIDR API and Genband Gateway took a tremendous amount of effort and significantly hindered progress on the project. This was to be expected, and over the course of a few weeks we compared and examined packet captures of all the network data flowing to and from our browsers to identify the issue with compatibility. Finally after a meeting with Bandwidth's offshore team, we were able to identify and fix an issue with a certain type of key agreement.

3. Resources Needed

- Dedicated server with an OS that supports Java 7 installed.
- Java 7 installed on the server and added to path.
- Vert.x installed on the server and added to the path.
- MongoDB installed on the server.
- An outward facing IP for clients to be able to contact the server.

- WebRTC enabled browser for clients to connect to the server.
- A telephone gateway for SIP services.

4. Requirements

Functional Requirements

The functional requirements below represent the outline for the system, but more in-detail requirements for the system including other sprint goals are included in **Appendix A**. Each requirement below is mapped (in parenthesis) with the corresponding sprint requirement.

1.0 - Account Management

1.1 - The system must allow a user to enter their Email, Name, Phone Number, and password on the homepage and have a profile created for them. **(BCON-10)**

1.2 - The system must allow a user to enter their Email and Password into a webpage and be redirected to the user directory tab on the dashboard page. **(BCON-11)**

1.3 - The system should save authentication credentials on the authenticated user's computer so that they can access the dashboard page again without relogging in. **(BCON-10)**

1.4 - The system must allow an authenticated user to view and edit their profile with fields for their name, email, and bandwidth, custom phone numbers in a priority order, and alias phone number. **(BCON-11, BCON-38)**

1.5 - The system must allow an authenticated user to add a priority to each phone number. **(BCON-38)**

2.0 - Dashboard

2.1 - The system must present an authenticated user with a directory table of all other registered users, listing their names, emails, and alias phone number. **(BCON-15, BCON-50)**

2.2 - The system should allow an authenticated user to filter their directory table results. **(BCON-15, BCON-40)**

2.3 - The system must allow authenticated users to initiate a call with a different user listed in a set of the filtered search results. **(BCON-16)**

2.4 - The system must allow authenticated users to view the profile information of a target user, listing their names, emails, alias phone number, and custom phonenumbers. **(BCON-38)**

3.0 - Initiating Calls

3.1 - The system must provide a unique URL that allows a user to initiate a WebRTC video call with the associated user. **(BCON-23)**

3.2 - The system must allow authenticated users on the dashboard page to receive call notifications from other users that wish to start a WebRTC video chat. **(BCON-21)**

3.3 - The system must allow an authenticated user to accept or decline a WebRTC video call request. **(BCON-21)**

3.4 - The system must automatically decline a call request for a user that has not responded after 15 seconds. **(BCON-20)**

3.5 - The system must notify the calling user if the called user is offline, non-existent, already in a call state, or declines the call. **(BCON-20)**

3.6 - The system must fail over to calling a remote user's phone number in the case that they are offline when receiving a call, one-by-one to each of the remote user's configured devices in a priority system. **(BCON-44)**

3.7 - The system must allow an authenticated user to initiate and receive phonecall to or from any valid 10 digit phone number. **(BCON-33, BCON-37, BCON-41, BCON-43, BCON-51)**

4.0 - During Calls

4.1 - The system must allow users in a call to view and hear each other. **(BCON-6, BCON-21)**

4.2 - The system must allow users in a call to view the video stream of themselves. **(BCON-6, BCON-21)**

4.3 - The system must allows users in a call to "hangup" the call at any time and be redirected back to the dashboard. **(BCON-25)**

4.4 - The system must automatically end a call and redirect a user to the dashboard page if the other party "hangs up" on the call. **(BCON-25)**

4.5 - The system must allow users to mute/unmute their microphone and pause their outgoing local video at any time. **(BCON-26)**

Non-functional Requirements

5.0 - Performance

5.1 - Account types that users can use (such as Google, Skype, etc.) must be scalable to allow new account types in the future.

6.0 - Compatibility

6.1 - Must be able to interface with both Chrome and Firefox

Constraints:

1. Must use WebRTC as the communication API
2. Must use WebSockets as the signaling mechanism for sending WebRTC metadata.
3. Must use scalable technologies to potentially allow a high volume of users.

Use Cases

| | |
|-----------------------|---|
| UC1 - AccountCreation | Use case for visitors of the site to create an account |
| Description | An employee of bandwidth would like to allow other people to contact from the web browser. The employee comes to this sites and fills out the registration information so that he is now a part of the system and can be contacted. |
| Scope | 1. Test that the user is added to the database 2. Test that the user comes up on the list of available users to contact |

| | |
|------------------|---|
| UC2 - PublicCall | Use case for visitors to call a registered user |
| Description | A visitor to the site can go to a specially generated URL and it will try and contact the user (based on the URL) if they are online. |

| | |
|-------|---|
| Scope | <ol style="list-style-type: none"> 1. Test that the visitor sees the offline notice if the user at the URL is offline 2. Test that the visitor is able to initiate a call with the user if the user is online |
|-------|---|

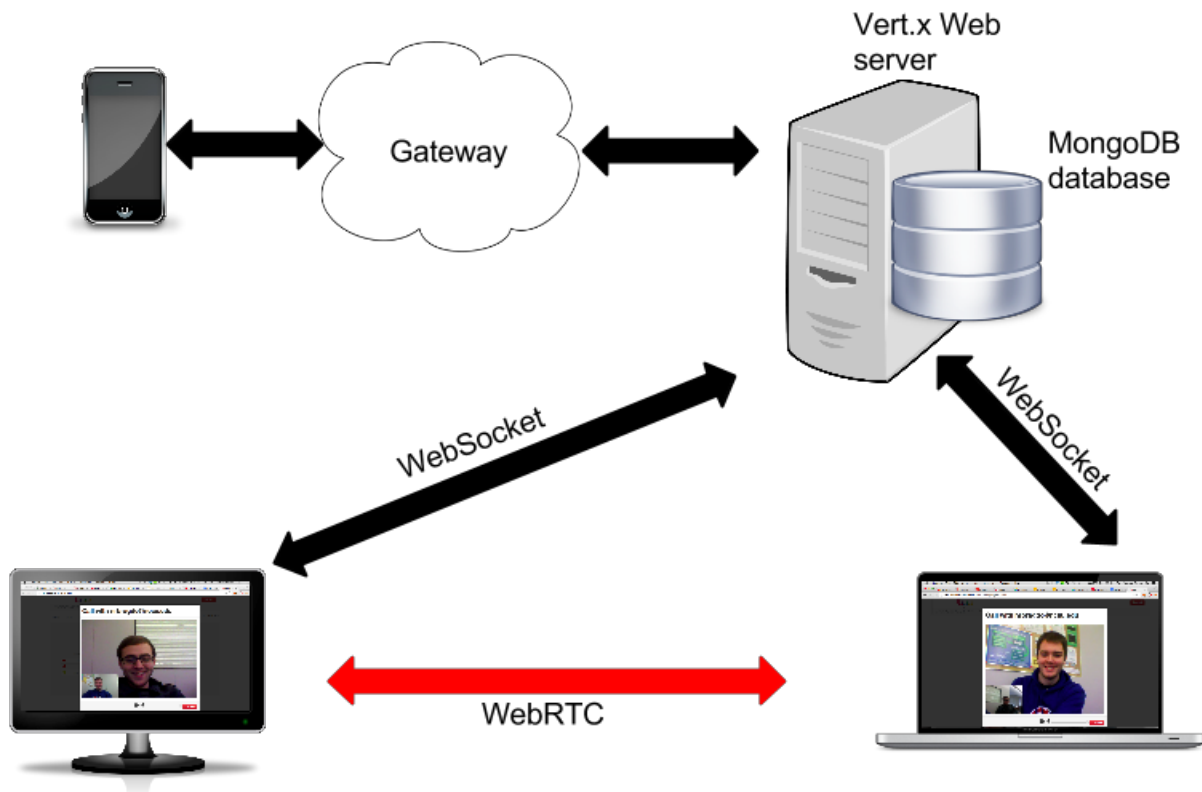
| | |
|-------------------------|--|
| UC3 - AuthenticatedCall | Use case for a registered user calling another registered user |
| Description | A registered user goes to their home page. They search for another user in the search box. Select an online user from the list that is generated from the search. Then click on the person. They then select the call method. The call is then initiated. |
| Scope | <ol style="list-style-type: none"> 1. Make sure the logged on user is authenticated 2. Make sure the logged on user is able to search for other logged on users 3. Make sure the logged on user is able to contact another logged on user based on the selected method. |

5. Design

As our project is more architecture focused with a need to be potentially scaled to an enterprise level, we chose to use technologies that would be easy to use and scale. Our web server is implemented in JavaScript with Vert.X, a multithreaded asynchronous framework that will be able to serve pages to potentially thousands of concurrent users on the site. Additionally, the Vert.X server serves as our WebSocket signaling server, a function needed to enable WebRTC video chat. Our database uses MongoDB, a NoSQL JavaScript backing store. MongoDB uses flexible JSON based schemas, which were easy to integrate into the Vert.x framework. All of these technologies used together help facilitate large amounts of connected users, as streaming video requires high amounts of data throughput. Additionally, since we used JavaScript everywhere, developers on the project were able to easily switch between different parts on the stack, increasing efficiency on the project.

Architecture:

Figure 1 - System Architecture



As Figure 1 shows, our system architecture features a Vert.x Web Server connected to a MongoDB Database via the Vert.x eventbus. The server serves pages to clients and then connects to the clients via WebSockets. In this example, both clients are connected to the Vert.x server via WebSockets. Once the two clients begin a call, the WebRTC connection is established, and all video/voice chat is done directly between the clients through their browsers. If one user is on their phone, the WebRTC is sent to the GENBAND gateway, which handles the interaction between phone and browser.

Figure 2 - WebRTC Sequence Diagram:

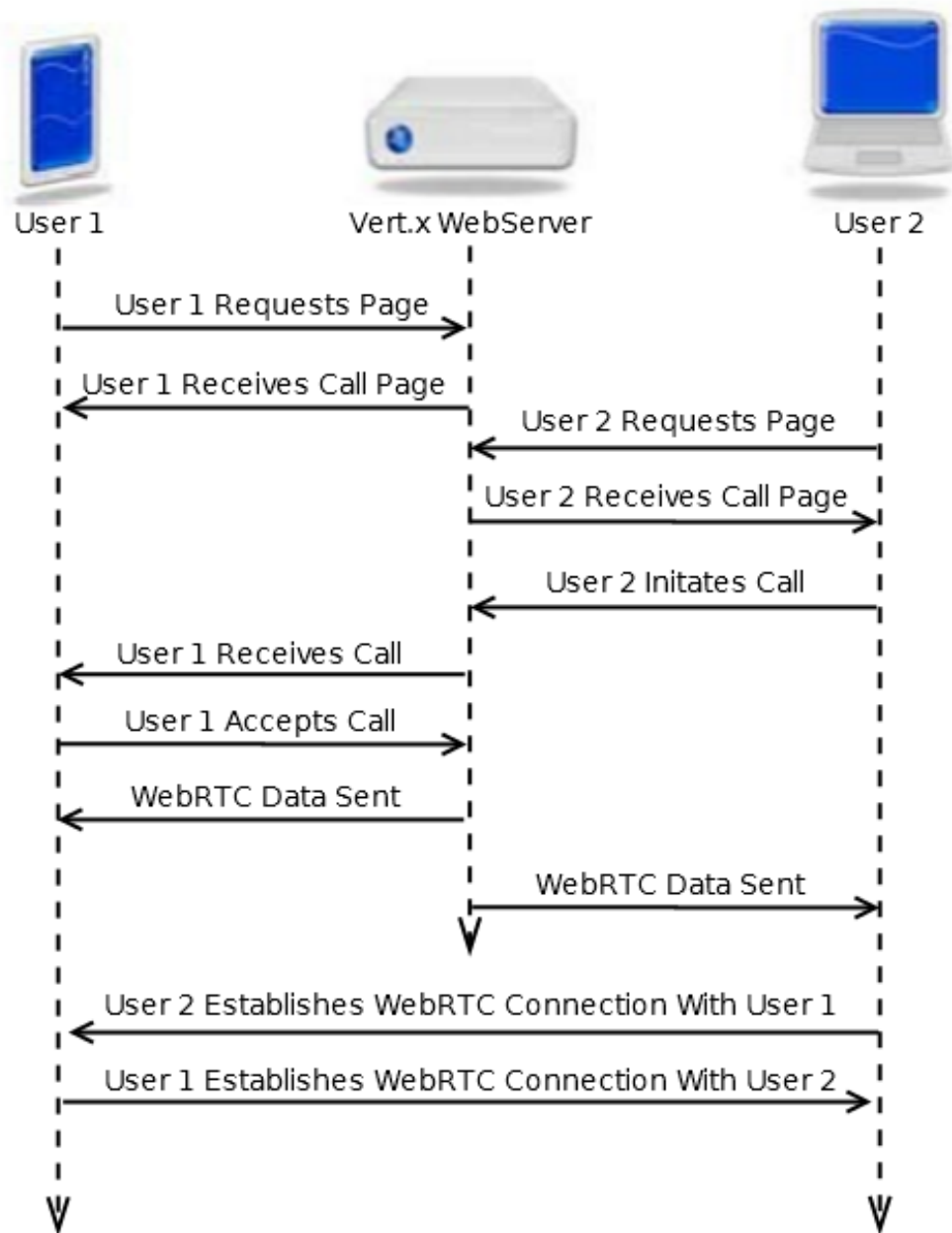


Figure 2 shows the sequence diagram for a user starting a WebRTC call with another user. The process starts by a user sending a call request to the other remote user via the WebSocket server. If the call is accepted, the users then exchange WebRTC metadata. Once the metadata is received by both parties, a WebRTC video call is initiated.

Figure 3 - Website UI Mockup:

Figure 3 (above) shows the wireframe UI originally created to give a brief summary of the initial functionality of Bandwidth Connector.

Implementation

Registration/Login Page:

When a user first visits the webpage, if they are not logged in, the registration/login page is displayed. After creating an account or logging in, they are redirected to the dashboard. Input fields in the registration form are checked for the correct format as they are typing.

bandwidth connector

Email address Password Sign in

Create New Account

E-Mail Address bandwidth ● Please enter a valid email address

First Name Brandon ●

Last Name Walker ●

Password ■■■

Retype Password ■■■

Create Account

Dashboard Page:

Once logged in, users are redirected to the dashboard page. This page displays all of the currently registered users in a searchable table. Clicking on a row will call that user. The search box filters the results as users type into it. The table supports searching for email, first name, last name, and phone number. Additionally the directory displays the availability status for each user in the direction in effort to notify users of others who are reachable.



Directory

Search by email, name, or phone #:

| | Email | Name | Alias |
|---|-------------------------|-------------------|------------|
| ● | ajferko@ncsu.edu | Andrew Ferko | 8042232958 |
| ● | fuchsnj@gmail.com | Nathan Fuchs | 8042232940 |
| ● | magaglia@ncsu.edu | Michael Gagliardo | 8042232928 |
| ● | mckinn@yahoo.com | Steve Yahoo | 8042232968 |
| ● | nrbragdo@ncsu.edu | Nick Bragdon | 8042232962 |
| ● | smckinnon@bandwidth.com | Steve McKinnon | 8042232961 |
| ● | tcross@bandwidth.com | Tyler Cross | 8042232839 |
| ● | twisterxiz@gmail.com | Brandon Walker | 8042232838 |

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Clicking on a user will call them. The user being called will be shown a popup allowing them to accept or reject the call. Once the call is started, each user will see the other person in a modal and see themselves in the bottom left corner. During the call, a user can mute the sound or video or hangup.

Profile Page:

There are two tabs on the dashboard page. The default tab is the "Home" tab which contains the dashboard. The second tab is the profile page which lets users view their profile information, and allows them to edit that information by clicking the "Edit Profile" button.

Profile

E-Mail Address

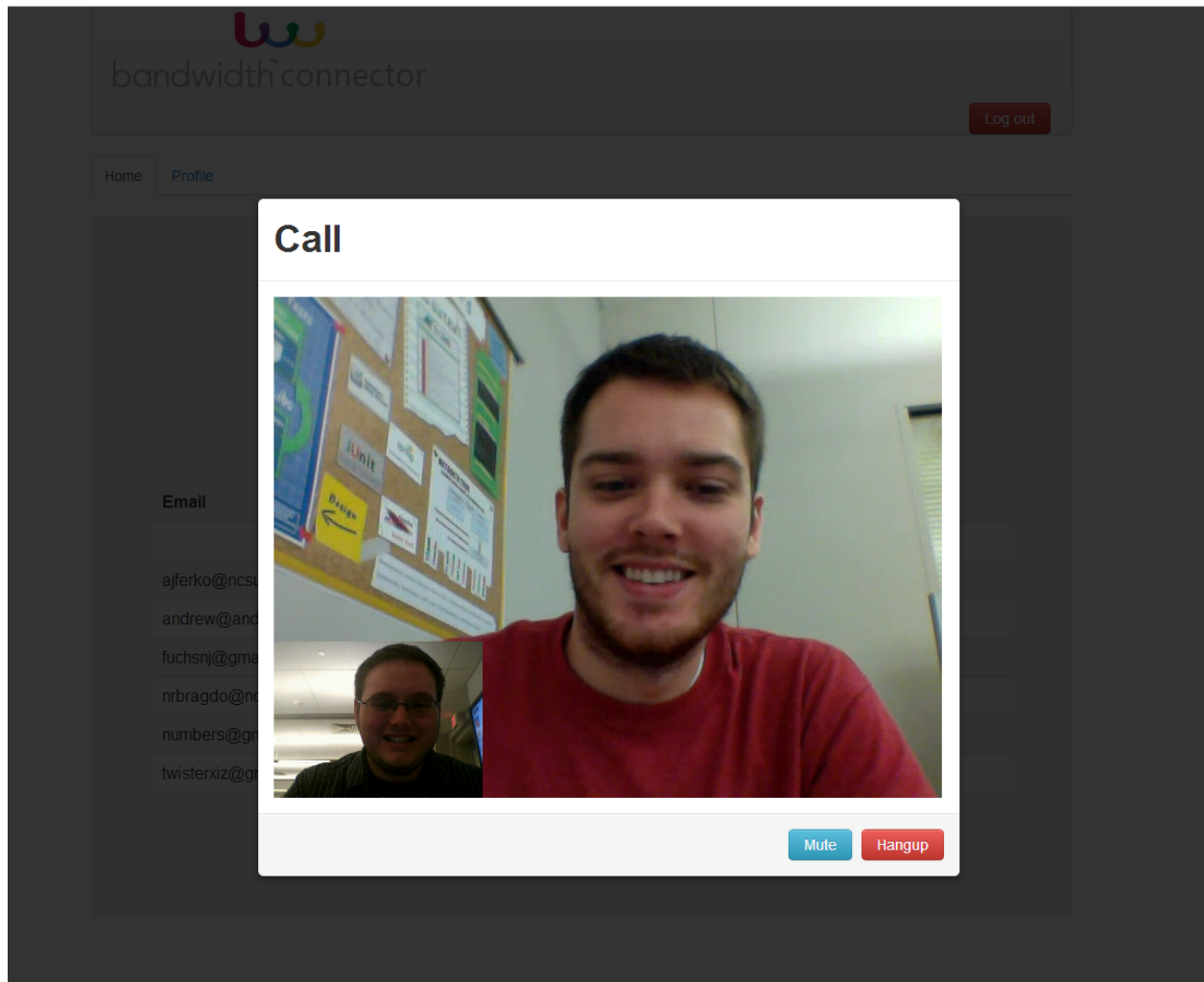
First Name

Last Name

Your Alias

Contact Devices: (Highest priority at top)

[Edit Profile](#)[Delete Account](#)



7. Test Plan & Results

Testing Strategy:

As JavaScript is notoriously hard to white-box test, we focused mainly on black-box testing. In lieu of formal white box testing, our sponsors agreed to weekly code reviews in an effort to maximize feature production. To comply with the test-driven development process, we wrote tests before writing any code. Each test was written by the team member who wrote the

code for that functionality. To ensure the functionality worked as designed, each test was run by a separate team member from the person who wrote the code before pushing to the git repository.

Black Box Test Plan:

** All references to John Doe refer to the user account created in the first test below.

** Jane Doe is another user that is already registered in the system.

** Bob is a user that is not registered in the system.

| Test ID | Description | Expected Results | Actual Results | Requirement Tested |
|-----------------|--|--|----------------|--------------------|
| userRegisters | Preconditions: <ul style="list-style-type: none"> The user is unregistered in the Connector system Steps: <ol style="list-style-type: none"> The user navigates to the Connector homepage In the "Create New Account" section, the user enters the following information: <ul style="list-style-type: none"> Email: jdoe@gmail.com First Name: John Last Name: Doe Phone Number: 9191234567 Password: password The user clicks the "Create Account" button | John Doe is now registered in the system and is redirected to the homepage. | | 1.1 |
| badInformation | Preconditions: <ul style="list-style-type: none"> The is unregistered in the Connector system Steps: <ol style="list-style-type: none"> The user visits the Connector homepage In the "Create New Account" section, the user enters the following information: <ul style="list-style-type: none"> Email: john First Name: jdoe@gmail.com Last Name: jdoe@gmail.com Phone Number: johndoe Password: x | The user is shown validation errors for every field | | 1.1 |
| duplicateEmail | Preconditions: <ul style="list-style-type: none"> The user is unregistered in the Connector system John Doe, with email address jdoe@gmail.com, is already registered in the system Steps: <ol style="list-style-type: none"> The user visits the Connector homepage In the "Create New Account" section, the user enters the following information: <ul style="list-style-type: none"> Email: jdoe@gmail.com First Name: James Last Name: Doe Phone Number: 9199876543 Password: hello The user clicks the "Create Account" button | The user is shown an error stating that a user with that email address already exists in the system. The new user account is not created | | 1.1 |
| successfulLogin | Preconditions: <ul style="list-style-type: none"> John Doe is a registered user and is not | John Doe is logged into the system and | | |

| | | | | |
|-------------------------|---|--|--|-----|
| | <p>already logged in</p> <p>Steps:</p> <ol style="list-style-type: none"> 1. John Doe navigates to the Connector homepage 2. John Doe enters his login information (Email: jdoe@gmail.com, Password: password) 3. John Doe does not check the "Remember Me" box 4. John Doe clicks "Sign In" | redirected to the Dashboard page | | 1.2 |
| unsuccessfulLogin | <p>Preconditions:</p> <ul style="list-style-type: none"> • John Doe is a registered user and is not already logged in <p>Steps:</p> <ol style="list-style-type: none"> 1. John Doe navigates to the Connector homepage 2. John Doe enters the following login information (Email: jdoe@gmail.com, Password: forgot) 3. John Doe does not check the "Remember Me" box 4. John Doe clicks "Sign In" | John Doe is not logged into the system and is shown an error message stating his username/password combination was incorrect | | 1.2 |
| testCookies | <p>Preconditions:</p> <ul style="list-style-type: none"> • John Doe is a registered user and is not already logged in <p>Steps:</p> <ol style="list-style-type: none"> 1. John Doe navigates to the Connector homepage 2. John Doe enters the following login information (Email: jdoe@gmail.com, Password: password) 3. John Doe checks the "Remember Me" box 4. John Doe clicks "Sign In" 5. John Doe navigates to google.com 6. John Doe navigates back to the connector homepage | John Doe is shown the dashboard page without having to log in again | | 1.3 |
| viewProfile | <p>Preconditions:</p> <ul style="list-style-type: none"> • John Doe is a registered user is and is logged into the home page (dashboard) <p>Steps:</p> <ol style="list-style-type: none"> 1. John Doe clicks on the "Profile" tab | John Doe is presented with his profile information (email address, first name, last name, phone number) | | 1.4 |
| viewDirectory | <p>Preconditions:</p> <ul style="list-style-type: none"> • John Doe is a registered user but is not currently logged on • There are other users registered in the system <p>Steps:</p> <ol style="list-style-type: none"> 1. John Doe logs into the system | John Doe is presented with a directory of all users in the system | | 2.1 |
| searchForRegisteredUser | <p>Preconditions:</p> <ul style="list-style-type: none"> • John Doe is a registered user and is currently on the dashboard page • Another user, with name Jane Doe and email janedoe@gmail.com, is registered in the system <p>Steps:</p> <ol style="list-style-type: none"> 1. John Doe enters "Jane Doe" into the search box | John Doe is presented with a table that includes Jane Doe and her information | | 2.2 |

| | | | | |
|---------------------------|--|--|--|-----|
| searchForUnregisteredUser | Preconditions: <ul style="list-style-type: none"> John Doe is registered in the system and is currently on the dashboard page No registered users have the name David Smith Steps: <ol style="list-style-type: none"> John Doe enters "David Smith" into the search box | John Doe is presented with a table that includes nothing | | 2.2 |
| anonymousUserName | Preconditions: <ul style="list-style-type: none"> John Doe is a registered user in the Connector system and is logged on User X is not logged on Steps: <ol style="list-style-type: none"> User X visits John Doe's call page (.../jdoe@gmail.com/call) | User X is prompted to enter his Name | | 3.1 |
| nakedURLCall | Preconditions: <ul style="list-style-type: none"> John Doe is a registered user in the Connector system and is logged on User X is not logged on Steps: <ol style="list-style-type: none"> User X visits John Doe's call page (.../jdoe@gmail.com/call) User X enters his name, "Bob" Bob allows the site to use his Camera/Microphone | John Doe is presented with a modal stating that Bob is calling him | | 3.1 |
| nakedURLCallAccept | Preconditions: <ul style="list-style-type: none"> John Doe is a registered user in the Connector system and is logged on User X is not logged on User X has visited John Doe's call page, entered his name, ("Bob"), and allowed the site to use his Camera/Microphone Steps: <ol style="list-style-type: none"> John Doe clicks on "Accept" in the modal popup John Doe allows the site to use his Camera/Microphone | John Doe and Bob are put into a call together | | 3.3 |
| nakedURLCallAudio | Preconditions: <ul style="list-style-type: none"> John Doe and Bob are in a call together Steps: <ol style="list-style-type: none"> John Doe says "Hello" | Bob hears John Doe say "Hello" | | 4.1 |
| nakedURLCallVideo | Preconditions: <ul style="list-style-type: none"> John Doe and Bob are in a call together Steps: <ol style="list-style-type: none"> John Doe waves his arm at the camera | Bob sees John Doe waving his arm at the camera. Bob laughs at how silly John Doe looks | | 4.1 |
| nakedURLCallLocalVideo | Preconditions: <ul style="list-style-type: none"> John Doe and Bob are in a call together Steps: <ol style="list-style-type: none"> John Doe waves his arm at the camera | John Doe can see himself waving his arm in the bottom left corner of the call modal | | 4.2 |
| nakedURLCallDecline | Preconditions: <ul style="list-style-type: none"> John Doe is a registered user in the Connector system and is logged on User X is not logged on | John Doe and Bob are not put into a call together. They cannot see or hear | | |

| | | | | |
|------------------------------|---|---|--|------------|
| | <ul style="list-style-type: none"> User X has visited John Doe's call page, entered his name, ("Bob"), and allowed the site to use his Camera/Microphone <p>Steps:</p> <ol style="list-style-type: none"> John Doe clicks "Decline" in the modal popup | each other | | 3.3 |
| registeredUserCall | <p>Preconditions:</p> <ul style="list-style-type: none"> John Doe is a registered user and is logged on Another user, Jane Doe, is already registered and logged on <p>Steps:</p> <ol style="list-style-type: none"> Jane Doe visits John Doe's call page (.../call/jdoe@gmail.com) | John Doe is presented with a modal stating that Jane Doe is calling him | | 3.1 |
| registeredUserCallAccept | <p>Preconditions:</p> <ul style="list-style-type: none"> John Doe is a registered user in the Connector system and is logged on Jane Doe is a registered user in the Connector system and is logged on Jane Doe has visited John Doe's call page, and allowed the site to use her Camera/Microphone <p>Steps:</p> <ol style="list-style-type: none"> John Doe clicks "Accept" on the popup modal John Doe allows the site to use his Camera/Microphone | John Doe and Jane Doe are put into a call together | | 3.3 |
| registeredUserCallAudio | <p>Preconditions:</p> <ul style="list-style-type: none"> John Doe and Jane Doe are in a call together <p>Steps:</p> <ol style="list-style-type: none"> Jane Doe says "Hello" | John Doe hears Jane Doe say "Hello" | | 4.1 |
| registeredUserCallVideo | <p>Preconditions:</p> <ul style="list-style-type: none"> John Doe and Jane Doe are in a call together <p>Steps:</p> <ol style="list-style-type: none"> Jane Doe waves her arm at the camera | John Doe can see Jane Doe waving her arm at the camera | | 4.1 |
| registeredUserCallLocalVideo | <p>Preconditions:</p> <ul style="list-style-type: none"> John Doe and Jane Doe are in a call together <p>Steps:</p> <ol style="list-style-type: none"> John Doe waves his arm at the camera | John Doe can see himself waving his arm in the bottom left corner of the call modal | | 4.2 |
| registeredUserCallDecline | <p>Preconditions:</p> <ul style="list-style-type: none"> John Doe is a registered user in the Connector system and is logged on Jane Doe is a registered user in the Connector system and is logged on Jane Doe has visited John Doe's call page, and allowed the site to use her Camera/Microphone <p>Steps:</p> <ol style="list-style-type: none"> John Doe clicks "Decline" on the modal popup | John Doe and Jane Doe are not put into a call together. They cannot see or hear each other. | | 3.5 |
| callNonLoggedInUser | <p>Preconditions:</p> <ul style="list-style-type: none"> John Doe is a registered user in the Connector system and is NOT logged on <p>Steps:</p> <ol style="list-style-type: none"> An unregistered user visits John Doe's call page (.../call/jdoe@gmail.com) The unregistered user enters "Bob" as | Bob is shown an error message stating that John Doe is not currently online. A call between Bob and John Doe is not | | 3.5 |

| | | | | |
|-------------------------------|---|---|--|-----|
| | <p>their name</p> <ol style="list-style-type: none"> Bob user allows the site to use his Camera/Microphone | created | | |
| callUserAlreadyInCall | <p>Preconditions:</p> <ul style="list-style-type: none"> John Doe and Jane Doe are both registered users and are already in a call together <p>Steps:</p> <ol style="list-style-type: none"> An unregistered user visits John Doe's call page (.../call/jdoe@gmail.com) The unregistered user enters "Bob" as their name Bob allows the site to use his Camera/Microphone | Bob is shown an error message stating that John Doe is currently in another call. A call between Bob and John Doe is not created. | | 3.5 |
| callNonExistantUser | <p>Preconditions:</p> <ul style="list-style-type: none"> John Doe is registered in the system and logged on There is nobody in the system with the username "nobody@here.com" <p>Steps:</p> <ol style="list-style-type: none"> John Doe visits (.../call/nobody@here.com) | John Doe is shown an error message stating that there is no user with the username nobody@here.com | | 3.5 |
| clickToEstablishCommunication | <p>Preconditions:</p> <ul style="list-style-type: none"> John Doe is a registered user in the system and logged into the Dashboard page Another user, with name Jane Doe, is registered in the system <p>Steps:</p> <ol style="list-style-type: none"> John Doe enters "Jane Doe" in the search box John Doe clicks on Jane Doe's name | A call is initiated between John Doe and Jane Doe | | 2.3 |
| callTimeout | <p>Preconditions:</p> <ul style="list-style-type: none"> John Doe is on the Dashboard page. Another user, Jane Doe, is logged into the sytem <p>Steps:</p> <ol style="list-style-type: none"> Jane Doe visits John Doe's call page (.../call/jdoe@gmail.com) Jane Doe allows the site to user her microphone and camera John Doe waits for longer than 15 seconds before clicking accept | Jane Doe receives an error message stating that the call to John timed out. No call is created between John and Jane | | 3.5 |
| callHangup | <p>Preconditions:</p> <ul style="list-style-type: none"> John Doe and Jane Doe are already in a call <p>Steps:</p> <ol style="list-style-type: none"> John Doe clicks "Hangup" in the call modal | The call between John and Jane is ended. The call modal on John Doe's screen closes and he is redirected to the dashboard page | | 4.3 |
| gotHungupOn | <p>Preconditions:</p> <ul style="list-style-type: none"> John Doe and Jane Doe are already in a call <p>Steps:</p> <ol style="list-style-type: none"> Jane Doe clicks "Hangup" in the call modal | The call between John and Jane is ended. The call modal on John Doe's screen closes and he is redirected to the dashboard page | | 4.4 |
| phonePreferences | <p>Preconditions:</p> <ul style="list-style-type: none"> John Doe is a registered user in the system and is on the Profile page | The phone number that John Doe dragged is now the | | 1.4 |

| | | | | |
|----------------------------|---|--|--|-----|
| | <ul style="list-style-type: none"> John Doe has three phone numbers entered in his profile Steps: <ol style="list-style-type: none"> John Doe clicks "Edit Profile" John Doe drags the bottom of the three phone numbers to the top of the list | highest number on the list | | |
| browserToPhoneCallInitiate | Preconditions: <ul style="list-style-type: none"> John and Jane Doe are both registered users in the system Both John and Jane Doe have phone numbers registered in their profiles John Doe is on the dashboard screen Steps: <ol style="list-style-type: none"> John Doe searches for Jane Doe in the directory John Doe clicks on Jane's name in the table John Doe clicks "Call Phone" on the modal popup | Jane's cell phone rings | | 3.7 |
| phoneToBrowserCallInitiate | Preconditions: <ul style="list-style-type: none"> John and Jane Doe are both registered users in the system John Doe is currently logged in Steps: <ol style="list-style-type: none"> Jane Doe calls John Doe's cell phone alias | John Doe gets a notification on his browser that Jane is calling him | | 3.7 |
| browserToPhoneAudio | Preconditions: <ul style="list-style-type: none"> John and Jane Doe are both registered users in the system Both John and Jane Doe have phone numbers registered in their profiles John Doe is on the dashboard screen Steps: <ol style="list-style-type: none"> John Doe searches for Jane Doe in the directory John Doe clicks on Jane's name in the table John Doe clicks "Call Phone" on the modal popups Jane accepts the call on her cell phone John and Jane say "Hello" to each other | John can hear Jane on his computer, and Jane can hear John on her cell phone | | 3.7 |
| phoneToBrowserAudio | Preconditions: <ul style="list-style-type: none"> John and Jane Doe are both registered users in the system John Doe is currently logged in Steps: <ol style="list-style-type: none"> Jane Doe calls John Doe's cell phone alias John Doe accepts the call on his browser John and Jane say "Hello" to each other | John can hear Jane on his computer, and Jane can hear John on her cell phone | | 3.7 |
| automaticFailover | Preconditions: <ul style="list-style-type: none"> John and Jane Doe are both registered users in the system Jane Doe is logged into the system John Doe has a cell phone listed in his profile Steps: <ol style="list-style-type: none"> Jane Doe searches for John Doe in the system | John Doe receives a call from Jane on his cell phone | | 3.6 |

| | | | | |
|--|--|---|--|-----|
| | <ol style="list-style-type: none"> Jane Doe clicks on John's name Jane Doe clicks "Call" on the popup modal | | | |
| failoverStopDeclinedCall | <p>Preconditions:</p> <ul style="list-style-type: none"> John and Jane Doe are both registered users in the system Jane and John Doe are both logged on John Doe has a cell phone listed in his profile <p>Steps:</p> <ol style="list-style-type: none"> Jane Doe searches for John Doe in the system Jane Doe clicks on John's name Jane Doe clicks "Call" on the popup modal John Doe declines the call on his browser | The system does not failover and does not call John's cell phone. Jane receives a message that John declined | | 3.6 |
| priorityCalling | <p>Preconditions:</p> <ul style="list-style-type: none"> John and Jane Doe are both registered users in the system Jane Doe is logged into the system but John is not John Doe has two phones listed in his profile - "Cell" and "Home", with Cell having a higher priority <p>Steps:</p> <ol style="list-style-type: none"> Jane Doe searches for John Doe in the system Jane Doe clicks on John's name Jane Doe clicks "Call" on the popup modal | John Doe receives a call on his Cell phone. When he doesn't answer, he then receives a call on his Home phone | | 3.6 |
| phoneToBrowse rHangupOnPhone | <p>Preconditions:</p> <ul style="list-style-type: none"> John and Jane Doe are currently in a call John is on his phone and Jane is on the browser <p>Steps:</p> <ol style="list-style-type: none"> John hangs up his phone | Jane's call is automatically hung up on her browser | | 4.3 |
| phoneToBrowse rHangupOnBrowser | <p>Preconditions:</p> <ul style="list-style-type: none"> John and Jane Doe are currently in a call John is on his phone and Jane is on the browser <p>Steps:</p> <ol style="list-style-type: none"> Jane clicks Hangup on her browser | John's phone call is automatically hung up | | 4.4 |
| noPhonesToCall | <p>Preconditions:</p> <ul style="list-style-type: none"> John and Jane Doe are users in the system Jane Doe is online and John is not online John does not have any phones listed in his profile <p>Steps:</p> <ol style="list-style-type: none"> Jane searches for John Doe in the system Jane clicks on John's name Jane Doe clicks "Call" on the popup modal | Jane is notified that John could not be reached | | 3.6 |
| callArbitraryPhoneNumberFromBrowser | <p>Preconditions:</p> <ul style="list-style-type: none"> John Doe is a user in the system John Doe is online <p>Steps:</p> <ol style="list-style-type: none"> John navigates to "bwc-app.oscar.ncsu.edu/call/phone/<number>" (where number is the tester's phone number) | The phone associated with <number> rings | | 3.7 |
| callArbitraryPhoneNumberFromBrowserAnonymously | <p>Preconditions:</p> <ul style="list-style-type: none"> John Doe is NOT logged in <p>Steps:</p> <ol style="list-style-type: none"> John navigates to | The phone associate with <number> does not ring | | 3.7 |

| | | | | |
|--|--|--|--|--|
| | "bwc-app.oscar.ncsu.edu/call/phone/<number>" (where number is the tester's phone number) | | | |
|--|--|--|--|--|

8. Suggestions for Future Teams

Mobile

We believe that mobile would be a good direction to take the project in the future. Our group focused on getting the application working for a laptop/desktop version. The functionality should all work on a mobile device but the UI would need some cleaning up, and probably some changes in situations where the implementations we chose wouldn't make sense on a mobile device. A mobile app that runs in the background could also accept video calls, which you normally couldn't do with your phone, this could potentially benefit a company like Republic Wireless who does Wifi based calling.

Backend Cleanup

Our initial goal with the application was to get webRTC setup and support browser to browser calling. We ended up making excellent progress and got into our stretch goals, which was connecting to Bandwidth's API and being able to make and receive calls with phones. This made some of our initial concepts, such as room creation when a person logs onto the site, not work quite as well. Going through and cleaning up some of that code and making it more scalable and reusable for all different kinds of connections could be a good idea.

GChat Integration

The main overarching vision behind the project is one URL to contact you anywhere. Currently the application only supports browser and phone, which is great but could use some more implementations. With the solid foundation that the application currently has another team could come in and add integration for gchat. So then you could make calls from the connector application to someone that is on their gchat.

Production Ready

We worked on the project with the idea that it is a prototype. Bandwidth was looking to test and see if an application like connector was a viable option. We focused heavily on adding new features and trying to get everything working by the end of the semester. There is always an opportunity cost in anything you do. We didn't focus heavily on certain features that would be a requirement to put something like this into a production environment. Another team could come along and make those changes so that this application would be ready to ship. Some examples of things to include would be secure password storage, changing the DB out to one that has more reliable transactions, etc.

9. Task Plan

| Item | Owner(s) | Due Date | Status |
|---|----------------------|------------|--------|
| - OPR 1 | Nick | Sept. 13th | ✓ |
| Sprint 1 | -- | -- | -- |
| - Choose Development and Execution Environment | All | Sept 12th | ✓ |
| - Local WebRTC video | Brandon | Sept 12th | ✓ |
| - Serve the Client | All | Sept 12th | ✓ |
| - Establish a Peer Connection | Brandon | Sept 12th | ✓ |
| - Signaling Relay Server | Brandon | Sept 12th | ✓ |
| - Network Level Architecture | All | Sept 12th | ✓ |
| Sprint 2 | -- | -- | -- |
| - Add video and audio to peer connection | Brandon | Sept 26th | ✓ |
| - Profile Management | Nick, Nathan | Sept 26th | ✓ |
| - Anonymous Calling | Andrew | Sept 26th | ✓ |
| - OPR 2 | Andrew | Oct 7th | ✓ |
| Sprint 3 | -- | -- | -- |
| - Profile Management | Nick | Oct 17th | ✓ |
| - Directory Display | Nick, Nathan | Oct 17th | ✓ |
| - Directory Click to Call | Andrew | Oct 17th | ✓ |
| - Calling Edge Cases | Brandon, Nathan | Oct 17th | ✓ |
| - IPR | All | Oct 21st | ✓ |
| - OPR 3 | Nathan, Brandon | Nov 1st | ✓ |
| Sprint 4 | -- | -- | -- |
| - More Profile Management | Nick, Andrew, Nathan | Oct 31st | ✓ |
| - Edit Directory Entries | Nick, Andrew, Nathan | Oct 31st | ✓ |
| - Receive Call Edge Cases | Brandon | Oct 31st | ✓ |
| - Connection State Change | Brandon | Oct 31st | ✓ |
| - Setup Permanent Server | All | Oct 31st | ✓ |
| Sprint 5 | -- | -- | -- |
| - Learn about Gateway API | All | Nov 21st | ✓ |
| - Try test calls in a native GENBAND configuration | All | Nov 21st | ✓ |
| - Register active users with the Gateway | Brandon | Nov 21st | ✓ |
| - Extend User Profile information to include additional addresses | Nick, Andrew, Nathan | Nov 21st | ✓ |
| Sprint 6 | -- | -- | -- |
| Installation Documentation | Brandon, Nathan | Dec 4th | ✓ |
| - Extend Client to call 10D addresses | Brandon | Dec 5th | ✓ |
| - Accept Incoming Gateway calls to Alias numbers | Brandon | Dec 5th | ✓ |
| - Extend Directory to display additional profile information | Nick | Dec 5th | ✓ |
| - Order TN through Iris API on Account Creation | Brandon | Dec 5th | ✓ |
| - Implement a priority system for phones | Brandon, Andrew | Dec 5th | ✓ |

| | | | |
|---------------------------|-----|----------|---|
| Posters and Pies | All | Dec 6th | ✓ |
| Final Presentation | All | Dec 13th | ✓ |

Appendix A - Jira Requirements (Completed)

| | |
|---|----------------------------|
| [BCON-53] Recommended Test Scenario Created: 27/Nov/13 Updated: 27/Nov/13 | |
| Status: | To Do |
| Project: | Bandwidth Connector |
| Component/s: | None |
| Affects Version/s: | None |
| Fix Version/s: | None |

| | | | |
|----------------------------|-----------------------|------------------|-----------------------|
| Type: | Story | Priority: | Major |
| Reporter: | Steve McKinnon | Assignee: | Steve McKinnon |
| Resolution : | Unresolved | Votes: | 0 |
| Labels: | None | | |
| Remaining Estimate: | Not Specified | | |
| Time Spent: | Not Specified | | |
| Original Estimate: | Not Specified | | |

| | |
|-------------------|---|
| Epic Link: | Connect to the Telephone Network |
|-------------------|---|

Description

Master Use Case


1. look at the discNumbers for the account
2. create a user
3. look at the discNumbers again

4. diff the discNumbers output --> demonstrate the TN that was ordered
5. look at the profile - point out the Alias
6. pull up an email signature with the user's address URL
7. place an anonymous call to the new user id
 - point out the fact that the call is contained completely in the browser
no download, no sign-up, no nothing
8. log in a second user
9. place a peer - peer call to that second user
 - voice and video
10. remind people about the alias
11. have somebody call the alias - answer the call
12. place a call to a user's cellphone using the directory
13. disconnect a user
14. place a call to that user from a user's client that is re-addressed to the cellphone.

| | |
|--|---------------------|
| [BCON-51] Order TN through Iris API on Account Creation Created: 07/Nov/13 Updated: 27/Nov/13 | |
| Status: | In Progress |
| Project: | Bandwidth Connector |
| Component/s: | None |
| Affects Version/s: | None |
| Fix Version/s: | None |

| | | | |
|----------------------------|---------------|------------------|----------------|
| Type: | Story | Priority: | Major |
| Reporter: | Tyler Cross | Assignee: | Steve McKinnon |
| Resolution : | Unresolved | Votes: | 0 |
| Labels: | None | | |
| Remaining Estimate: | Not Specified | | |

| | | | |
|--------------------|---------------|--|--|
| Time Spent: | Not Specified | | |
| Original Estimate: | Not Specified | | |

| | |
|--------------|--|
| Attachments: |  NCSU Real Numbers.xlsx |
| Epic Link: | Connect to the Telephone Network |

Description

When a user creates an account with Bandwidth Connector an 'alias' number should be ordered from the Iris API.

Summary

There are interactions between the users that the gateway recognizes and the users in the bwc app server that really means that the gateway needs to know of the numbers before hand.

[REDACTED]

Overly complex I know, but I think that it will work.

Comments

Comment by [Steve McKinnon](#) [27/Nov/13]

Now that we have a network interconnection scenario that works in both directions, I have revisited the number ordering story, and reaffirmed that we need to be working from a specific pool of numbers associated with the account. This is because the SPiDR configuration needs to know what the users / numbers are to allow registration.

I will:

set up the GENBAND SPiDR gateway so that it knows about the numbers

allocate them all in the network, and make them orderable using the APIs in the story.

The numbers allocated in the real network are in the attached spreadsheet

The access to the network that I provided earlier was to our test system. To complete the project you need to be working into our operational network, so I need to provide you with an updated base URL, which is...

[REDACTED]

All of this information has been updated in the story.

Steve

Comment by [Steve McKinnon](#) [27/Nov/13]

The list of numbers that can be (re) used for calling into and out of BWC

[BCON-50] [Extend Directory to display additional profile information](#) Created: 31/Oct/13

Updated: 27/Nov/13

| | |
|---------------------------|--|
| Status: | In Progress |
| Project: | Bandwidth Connector |
| Component/s: | None |
| Affects Version/s: | None |
| Fix Version/s: | None |

| | | | |
|---------------------|---------------------------------------|------------------|---------------------------------------|
| Type: | Story | Priority: | Major |
| Reporter: | Steve McKinnon | Assignee: | Steve McKinnon |
| Resolution : | Unresolved | Votes: | 0 |
| Labels: | None | | |
| Remaining | Not Specified | | |

| | | | |
|--------------------|---------------|--|--|
| Estimate: | | | |
| Time Spent: | Not Specified | | |
| Original Estimate: | Not Specified | | |

| | |
|--------------|---|
| Issue Links: | <div>Cloners</div> <div>clones</div> <div>B Extension</div> <div>C d c</div> <div>O User r</div> <div>N Profile e</div> <div>- e</div> <div>3 infor</div> <div>8 matio</div> <div>n to</div> <div>in...</div> |
| Epic Link: | Connect to the Telephone Network |

Description

| |
|---|
| <p>Intent: As a BCON user I can see the ALIAS DN and Additional Devices for users in the Directory</p> <p>Description / Background</p> <p>The ability to place and receive calls from the Telephone Network requires extensions to the addressability of the BCON users.</p> <ol style="list-style-type: none">1. The Users will have an "Alias" number that is used to reach them from devices and networks that cannot deal with text-based addresses.2. The Users already have additional numerically addressed devices |
|---|

(Cellphones, Home phones) that can be used to communicate with them
These addresses need to be visible or accessible in the User Directory. This applies to the Alias Telephone Number and the Telephone Numbers associated with each of the Devices

UI

- extensions to the directory page to show
 - Each user's Alias telephone number
- The additional devices that a user is (potentially) reachable on.

API

No API changes are required for this story.


Acceptance Criteria

Acceptance requires demonstration of...

- The directory display for users containing Alias and Alternative Device access information.
 - documentation updated
- functional tests documented, executed and passed

| | |
|---|---------------------|
| [BCON-44] Place outbound 10D call to Network via the Directory Created: 31/Oct/13 Updated: 27/Nov/13 | |
| Status: | To Do |
| Project: | Bandwidth Connector |
| Component/s: | None |
| Affects Version/s: | None |
| Fix Version/s: | None |

| | | | |
|---------------------|----------------|-----------|----------------|
| Type: | Story | Priority: | Major |
| Reporter: | Steve McKinnon | Assignee: | Steve McKinnon |
| Resolution : | Unresolved | Votes: | 0 |
| Labels: | None | | |
| Remaining Estimate: | Not Specified | | |
| Time Spent: | Not Specified | | |
| Original Estimate: | Not Specified | | |

| | |
|--------------|--|
| Attachments: |  otherdevices.png |
| Epic Link: | Connect to the Telephone Network |

Description

Intent: Allow a user to place a call to the alternative device associated with a user

Description / Background

This story extends the Directory capability to allow a logged in user to place calls to the telephony device(s) (like a cellphone) associated with a user. If a user has configured one or more external numbers as part of their profile, the directory will indicate that they have multiple devices, and allow a caller to select amongst those devices to place a call. If the user selects a device a voice call is placed to the address associated with that device in the selected user's profile.

UI

This story adds some content to the home-page to allow calling phones that a user

has put in their profile. The numbers do not need to be displayed, but selecting the button / icon / widget should place a call to the number provisioned for that capability.

See the attached screen-shot. Buttons are fine rather than Icons if that works.

Acceptance Criteria

- Demonstration of the UI Changes that allow a call to be made to the devices associated with an other user's profile
- Demonstration of calls placed from the directory page to the intended Telephone network destination.
 - documentation updated
 - functional tests documented, executed and passed

| | |
|---|--|
| [BCON-43] Accept Incoming Gateway calls to Alias numbers Created: 31/Oct/13 Updated: 27/Nov/13 | |
| Status: | To Do |
| Project: | Bandwidth Connector |
| Component/s: | None |
| Affects Version/s: | None |
| Fix Version/s: | None |

| | | | |
|----------------------------|---------------------------------------|------------------|---------------------------------------|
| Type: | Story | Priority: | Major |
| Reporter: | Steve McKinnon | Assignee: | Steve McKinnon |
| Resolution : | Unresolved | Votes: | 0 |
| Labels: | None | | |
| Remaining Estimate: | Not Specified | | |

| | | | |
|---------------------------|----------------------|--|--|
| Time Spent: | Not Specified | | |
| Original Estimate: | Not Specified | | |

| | |
|-------------------|--|
| Epic Link: | Connect to the Telephone Network |
|-------------------|--|

Description

Intent: When a user's ALIAS number is called the call needs to be extended to the user's logged in BCON web-page

Description / Background

This should act just like a call from one user to another. Once the ALIAS is detected on an incoming call from the phone network, the call should be converted to use the user's main identity. The call should be presented to the webRTC user if that user is logged in.

UI

Use the existing UI that is used to present incoming calls to a user

- error condition handling is not required for this story.

Acceptance Criteria

- Demonstration that an incoming call to a user's alias is presented to that user via their browser if the user is logged on.
 - documentation updated
 - functional tests documented, executed and passed

| | |
|--|--|
| [BCON-41] Extend Client to call 10D addresses Created: 31/Oct/13 Updated: 27/Nov/13 | |
| Status: | To Do |
| Project: | Bandwidth Connector |
| Component/s: | None |
| Affects Version/s: | None |
| Fix Version/s: | None |

| | | | |
|----------------------------|---------------------------------------|------------------|---------------------------------------|
| Type: | Story | Priority: | Major |
| Reporter: | Steve McKinnon | Assignee: | Steve McKinnon |
| Resolution : | Unresolved | Votes: | 0 |
| Labels: | None | | |
| Remaining Estimate: | Not Specified | | |
| Time Spent: | Not Specified | | |
| Original Estimate: | Not Specified | | |

| | |
|-------------------|---|
| Epic Link: | Connect to the Telephone Network |
|-------------------|---|

Description

Intent: As a BCON user I can place calls from my browser to any number in North America

Description / Background

Very briefly - a logged in user needs to be able to place a call to a number, by filling in that number on the main page - perhaps at the top of the directory.

- Data entry should be via a text box that accepts 10 digits (no more / no less)
 - A Call should be established to that number

UI

- Extend the main page UI by adding a number entry box that demands 10 digits.
 - it requires logging in first.
- Describe the function with something like "call anybody in the USA". or something like that
- Another alternative might be to create an additional tab, or to gather the digits from a modal dialog launched by a button - any UI approach will do.

Technical Considerations

- the actual address that is called is [REDACTED]

Exclusions and Limitations

Acceptance Criteria

- Demonstrate a successful call to a 10 digit number from the main page
 - documentation updated
 - functional tests documented, executed and passed

[BCON-40] **Directory - permit DN based search** Created: 31/Oct/13 Updated: 31/Oct/13

Status:

Project:

To Do

Bandwidth Connector

| | |
|---------------------------|-------------|
| Component/s: | None |
| Affects Version/s: | None |
| Fix Version/s: | None |

| | | | |
|----------------------------|-----------------------|------------------|-----------------------|
| Type: | Story | Priority: | Minor |
| Reporter: | Steve McKinnon | Assignee: | Steve McKinnon |
| Resolution : | Unresolved | Votes: | 0 |
| Labels: | None | | |
| Remaining Estimate: | Not Specified | | |
| Time Spent: | Not Specified | | |
| Original Estimate: | Not Specified | | |

| | |
|-------------------|---|
| Epic Link: | Connect to the Telephone Network |
|-------------------|---|

Description

***Intent: ***

Description / Background

UI

API

Operational Considerations

Exclusions and Limitations

Acceptance Criteria

- documentation updated
- functional tests documented, executed and passed

**[BCON-38] Extend User Profile information
to include additional addresses** Created: 31/Oct/13

Updated: 21/Nov/13 Resolved: 21/Nov/13

Status:

Done

Project:

Bandwidth Connector

Component/s:

None

Affects Version/s:

None

Fix Version/s:

None

| | | | |
|-----------------|----------------|-----------|----------------|
| Type: | Story | Priority: | Major |
| Reporter: | Steve McKinnon | Assignee: | Steve McKinnon |
| Resolution : | Done | Votes: | 0 |

| | | | |
|---------------------|---------------|--|--|
| Labels: | None | | |
| Remaining Estimate: | Not Specified | | |
| Time Spent: | Not Specified | | |
| Original Estimate: | Not Specified | | |

| | |
|--------------|--|
| Issue Links: | <div>Cloners</div> <div>is cloned by</div> <div><div><div>E</div><div>Ext</div><div>I</div></div><div><div>C</div><div>nd</div><div>n</div></div><div><div>C</div><div>Dire</div></div><div><div>N</div><div>ctory</div><div>P</div></div><div><div>-</div><div>to</div><div>r</div></div><div><div>5</div><div>displ</div><div>o</div></div><div><div>0</div><div>ay</div><div>g</div></div><div><div>addit</div><div>r</div></div><div><div>iona.</div><div>e</div></div><div><div>..</div><div>s</div></div><div><div>s</div></div></div> |
| Epic Link: | Connect to the Telephone Network |

Description

Intent: As a BCON user I can manage and ALIAS DN and Additional Device Telephone Numbers in my profile

Description / Background

The ability to place and receive calls from the Telephone Network requires extensions to the addressability of the BCON users.

- 1. The Users will have an "Alias" number that is used to reach them from devices and networks that cannot deal with text-based addresses.**
- 2. The Users already have additional numerically addressed devices (Cellphones, Home phones) that can be used to communicate with them**

These addresses need to be added into the User Profile, and the user must be able to add and edit them. This applies to the Alias Telephone Number and the Telephone Numbers associated with each of the Devices

UI

- **extensions to the profile / profile edit page to allow**
 - **addition and editing of the Alias telephone number**
- **addition and editing of the Telephone Numbers associated with other existing devices in the network**
 - **auto-population of the Alias number using the IRIS API**

API

No API changes are required for this story.

Acceptance Criteria

Acceptance requires demonstration of...

- **Addition and editing of an Alias Telephone Number**
 - **Addition and editing of Telephone Numbers associated with a user's IRL devices**
 - **documentation updated**
 - **functional tests documented, executed and passed**
-

| | |
|---|---------------------|
| [BCON-37] Register active users with the Gateway Created: 31/Oct/13 Updated: 14/Nov/13 Resolved: 14/Nov/13 | |
| Status: | Done |
| Project: | Bandwidth Connector |
| Component/s: | None |
| Affects Version/s: | None |
| Fix Version/s: | None |

| | | | |
|----------------------------|----------------|------------------|----------------|
| Type: | Story | Priority: | Major |
| Reporter: | Steve McKinnon | Assignee: | Steve McKinnon |
| Resolution : | Done | Votes: | 0 |
| Labels: | None | | |
| Remaining Estimate: | Not Specified | | |
| Time Spent: | Not Specified | | |
| Original Estimate: | Not Specified | | |

| | |
|-------------------|----------------------------------|
| Epic Link: | Connect to the Telephone Network |
|-------------------|----------------------------------|

Description

Intent: As a BCON designer I can see that users registered in BCON are also registered in the Gateway

Description / Background

This story will create the message flows from BCON to the Gateway to allow users on BCON to be registered at the Gateway.

This will involve:

- configuration of users on the Gateway
- sending registration messages to the Gateway to register users
 - can be done in bulk, or on other key events
 - like system start, the addition of a user, or the timeout of a prior registration
 - can alternatively be done when a user registers
- be careful of the registration state in prep for cases where the user is not there, but where BCON will be acting on their behalf.

This can be verified by inspecting the user information and state in the Gateway

Users will have to be pre-configured on the Gateway to allow the registration activity to be recognized.

API

- No BCON API changes are anticipated
- The Registration / subscription API on the gateway must be exercised
 - no Security is required around the Gateway.

Acceptance Criteria

Acceptance requires:

- demonstration of the Registration messaging
 - demonstration of the Registratoin State on the Gateway
 - documentation updated
 - functional tests documented, executed and passed
-

| | |
|---|----------------------------|
| [BCON-36] [Design Spike] Try test calls in a native GENBAND configuration Created: 31/Oct/13 Updated: 14/Nov/13 Resolved: 14/Nov/13 | |
| Status: | Done |
| Project: | Bandwidth Connector |
| Component/s: | None |
| Affects Version/s: | None |
| Fix Version/s: | None |

| | | | |
|----------------------------|-----------------------|------------------|-----------------------|
| Type: | Story | Priority: | Major |
| Reporter: | Steve McKinnon | Assignee: | Steve McKinnon |
| Resolution : | Done | Votes: | 0 |
| Labels: | None | | |
| Remaining Estimate: | Not Specified | | |
| Time Spent: | Not Specified | | |
| Original Estimate: | Not Specified | | |

| | |
|-------------------|---|
| Epic Link: | Connect to the Telephone Network |
|-------------------|---|

Description

- terminating on GENBAND network
- a chance for some message capture.

Intent: As a BCON Designer I can see the basic Gateway functions in operation, and capture the key message flows.

Description / Background

One of the initial setup phases for the GENBAND Gateway should/sill/can involve interconnection to the GENBAND core network, allowing a product-level configuration to act as a test bed and learning tool. This configuration can be used to place calls to and from the network through the gateway to gain an understanding of network and gateway function.

Precondition: the Gateway is operational and connected to the GENBAND core network.

Activities in this story:

- reviewing the configuration of the Gateway
- configuring subscribers on the gateway as required.
- registering a web client with the gateway and observing the messaging
 - placing a call to the GENBAND core network
 - receiving a call from the GENBAND core network

Acceptance Criteria

- successful registration to the gateway from a product client
 - successful call to the network
 - successful call from the network
- some documentation / message capture (<http://tools.valid8.com/> might be useful)

| | |
|---|----------------------------|
| [BCON-35] [Design Spike] Document the BCON <-- --> Network Call Flows Created: 31/Oct/13 Updated: 02/Dec/13 | |
| Status: | To Do |
| Project: | Bandwidth Connector |
| Component/s: | None |

| | |
|---------------------------|-------------|
| Affects Version/s: | None |
| Fix Version/s: | None |

| | | | |
|----------------------------|--------------------------------|------------------|--------------------------------|
| Type: | Story | Priority: | Major |
| Reporter: | Steve McKinnon | Assignee: | Steve McKinnon |
| Resolution : | Unresolved | Votes: | 0 |
| Labels: | None | | |
| Remaining Estimate: | Not Specified | | |
| Time Spent: | Not Specified | | |
| Original Estimate: | Not Specified | | |

| | |
|-------------------|--|
| Epic Link: | Connect to the Telephone Network |
|-------------------|--|

Description

Intent: As a BCON Designer I will understand the message flows required to get calls through the Gateway (on paper)

Description / Background

This Design Spike story requires a basic understanding of the calls that will be placed over the Gateway, and the message sequences that are required to implement those calls.

This design spike will document:

- The main communication flows that are requires
- The messaging that is associated with the main communication flows.

Note that the various routing and service choices do not impact the primary call flows. The primary call flows are discussed in the EPIC and the list of Stories (I'm being deliverately obtuse here)

I recommend using a tool like [MSCGEN](#) to help capture the flows.

Acceptance Criteria

- documentation of the communication message flows that will be required for the basic communications

[BCON-34] [\[Design spike\] - Learn about Gateway API](#) Created: 31/Oct/13 Updated: 14/Nov/13

Resolved: 14/Nov/13

| | |
|---------------------------|-------------------------------------|
| Status: | Done |
| Project: | Bandwidth Connector |
| Component/s: | None |
| Affects Version/s: | None |
| Fix Version/s: | None |

| | | | |
|----------------------------|--------------------------------|------------------|--------------------------------|
| Type: | Story | Priority: | Major |
| Reporter: | Steve McKinnon | Assignee: | Steve McKinnon |
| Resolution : | Done | Votes: | 0 |
| Labels: | None | | |
| Remaining Estimate: | Not Specified | | |
| Time Spent: | Not Specified | | |

| | | | |
|---------------------------|----------------------|--|--|
| Original Estimate: | Not Specified | | |
|---------------------------|----------------------|--|--|

| | |
|-------------------|--|
| Epic Link: | Connect to the Telephone Network |
|-------------------|--|

Description

Intent: As a BCON designer I have a basic understanding of the API that I will be using to access the Telephone network through the Gateway

Description / Background

This one is simple:


- Skim / Read the 2 API documents
- Ask the questions that come to mind.

Acceptance Criteria

- All questions asked
- All asked questions answered

| | |
|---|--|
| [BCON-33] Connect to the Telephone Network <small>Created: 30/Oct/13 Updated: 27/Nov/13</small> | |
| Status: | To Do |
| Project: | Bandwidth Connector |
| Component/s: | None |
| Affects Version/s: | None |
| Fix Version/s: | None |

| | | | |
|---------------------|----------------|-----------|----------------|
| Type: | Epic | Priority: | Major |
| Reporter: | Steve McKinnon | Assignee: | Steve McKinnon |
| Resolution : | Unresolved | Votes: | 0 |
| Labels: | None | | |
| Remaining Estimate: | Not Specified | | |
| Time Spent: | Not Specified | | |
| Original Estimate: | Not Specified | | |

| | |
|--------------|--|
| Attachments: |  webRTC for NCSU EA Model.zip |
| Epic Name: | Connect to the Telephone Network |

Description

GOAL: Demonstrate the ability to make and receive calls from traditional voice endpoints through a provided webRTC gateway

Description

This EPIC extends the addressing model, and adds interaction with the Telephone network, to support a number of use cases that relate to 10 Digit addressing. The ultimate objective is to permit...

- a user to be communicated with if they are anywhere on the network
- a user to contact anybody in the world from their webRTC device.

Use Cases

Use Case 1 - Telephone Number Addressability

- a user will have an "Alias" that is a 10D phone number, that can be used to contact them just like their user-id can.
 - a webRTC user can call them using their 10D alias
- a Telephone Network user can call them using their 10D alias.

Use Case 2 - Calling anywhere

- a user can place a call to any 10D number in the USA.

Use Case 3 - Multiple Addressable Devices for a user

- A call can be placed to a user@device, for example user@cell will ring their cellphone, user@webRTC will ring their webRTC devices, user@home...
- calling the user from another webRTC user extends the offer to all devices associated with that user
- calling the user from the Telephone Network using their Telephone Number Alias extends the offer to all devices associated with that user

Network Configuration

Please see the attached zip file for a rough design model that covers the network architecture and some call placement behaviors.

In general the BCON App Server created by this project will interact with the gateway using the REST API exposed by the gateway. Some key attributes of this interaction are...

- The gateway requires users to register if they are to be addressable on the webRTC side of the gateway. That means that users that are active on the BCON App Server must also be Registered using the Registration component of the API.
 - The gateway uses a [REDACTED]
- The gateway may require that the users be configured / provisioned in the gateway database. This can be done manually as required.
- The gateway also expects to "proxy" client registrations that it receives towards the Telephone Network. Tyler and I will be inserting an additional

component in the configuration to handle that behavior. It should be transparent to the BCON App Server.

Decomposition of Functionality / Tasks

1. Gateway and Network Component Familiarity

- become conversant in the Gateway API and call flows
- use the existing GENBAND Client configured to the GENBAND network, etc to make a couple of calls and receive a couple of calls.
- use the existing GENBAND Client configured to the Bandwidth Core Network to place a couple of calls.

2. TN Addressing extension to the BCON App Server / URL Router

- Augment user information to contain one or more 10D "alternative DN"s (the user's Cell Phone, home phone, ...)
- Augment the user information to contain a 10D "alias DN"
 - this is the address of the webRTC user from the telephone network. If I dial this number from any phone in NA (the world) then the call would be extended from the Bandwidth network to the Gateway and subsequently to the user as controlled by the App Server.
- augment the directory to include additional user data
 - devices available, 10D alias, ...
- Augment user search to return 10D (optional / low priority)

3. Client Changes

- Augment Client UI to call a user's 10D devices
 - use /call/user?device=<something|all>
- Augment Client UI to call 10D (any 10D)
 - use /call/oldschool/10D

4. Communication Handling

- Augment communication handling to enable incoming 10D calls to registered users
- Augment BCON App Server to Register with the Gateway for in-service users
 - Augment API /call/network/10D
 - this places a call to any 10D number from the client. Based on the nature of the 10D (Alias or not) the call will be extended to the local registered user, or to the outside world.
 - this will not work until the Gateway is operational
 - Augment API /call/user?device=<something>
 - places a call to the user using their alias

5. Gateway Rest API - Calls to the network

- Register users and Aliases with the GENBAND Gateway to enable

- incoming calls to find you (and to enable outbound calling)
 - Use the GENBAND REST API to place calls to the network
 - conform to the messaging and state model
- 6. Gateway REST API - receiving calls from the network
 - Extend incoming calls to the user if registered and owns the DN
 - Rejects calls if unaddressable
 - conform to the messaging and state model
- 7. Fun an Fancy things
 - call registered user then cell phone
 - call everything at once.
 - whatever else that you can think of

Comments

Comment by [Steve McKinnon](#) [30/Oct/13]

Use Firefox to view the Model (index.html). The javascript crashes chrome.

[BCON-32] [Stand up the App Server on a real server and free up Brandon's Laptop](#) Created:

17/Oct/13 Updated: 31/Oct/13 Resolved: 31/Oct/13

| | |
|---------------------------|-------------------------------------|
| Status: | Done |
| Project: | Bandwidth Connector |
| Component/s: | None |
| Affects Version/s: | None |
| Fix Version/s: | None |

| | | | |
|------------------------|--------------------------------|------------------|--------------------------------|
| Type: | Story | Priority: | Major |
| Reporter: | Steve McKinnon | Assignee: | Steve McKinnon |
| Resolution : | Done | Votes: | 0 |

| | | | |
|----------------------------|----------------------|--|--|
| Labels: | None | | |
| Remaining Estimate: | Not Specified | | |
| Time Spent: | Not Specified | | |
| Original Estimate: | Not Specified | | |

Description

Description

Implement the App Server functions on the Server that Tyler has stood up in John's Lab.

Acceptance Criteria.

Demonstrate the functions identified in previous stories running on multiple laptops, and hosted in John's lab.

- multiple laptops
- running from bandwidth LAN environments
- Fix cookies from moving to NCSU domain

| | |
|---|-------------------------------------|
| [BCON-26] Handle Connection State Change - Mute, UnMute, Hold Created: 11/Sep/13 Updated: 31/Oct/13 | |
| Status: | In Progress |
| Project: | Bandwidth Connector |

| | |
|---------------------------|------|
| Component/s: | None |
| Affects Version/s: | None |
| Fix Version/s: | None |

| | | | |
|----------------------------|--------------------------------|-------------------|--------------------------------|
| Type: | Story | Priority: | Minor |
| Reporter : | Steve McKinnon | Assignee : | Steve McKinnon |
| Resolution: | Unresolved | Votes: | 0 |
| Labels: | None | | |
| Remaining Estimate: | Not Specified | | |
| Time Spent: | Not Specified | | |
| Original Estimate: | Not Specified | | |

| | |
|-------------------|---|
| Epic Link: | The Pure webRTC Application |
|-------------------|---|

Description

Intent: As a BCON user I can change the behavior of the communications in the middle of the communications

Description / Background

This capability adds 3 controls and state changes to the existing communications session environment:

- the ability to mute the Mic
- the ability to mute the Video Feed
- the ability to suspend the session so that other communications sessions can be handled

Leveraging the suspended session state, the user should be able to initiate or receive communications from other users while the existing session is in a suspended state. This capability should permit

- suspending the communication session
- resuming a chosen suspended session
 - this should only be allowed by the party initiating the suspension
- initiating communications with another user while suspended
- receiving and answering communications requests while in a suspended state
- receiving and answering communications requests while in an active state.
 - this should put any active session into suspension in order to process the communication request.

UI

- Muting the Microphone and Video Feed should provide end user feedback to the muting user that makes the muted condition obvious.
 - (optional) information can be presented to the other end of the communication to indicate that the video / audio has been muted by the other user.
- suspended state information should be available to both parties, without regard to who suspended the session
- user controls need to be established for muting and suspending (and restoring) sessions.

API

Operational Considerations

Exclusions and Limitations

Acceptance Criteria

Acceptance requires demonstration of...

- muting and un-muting audio and video
- suspending and resuming sessions
- handling other communications while suspended
- toggling between suspended sessions
- documentation updated
- functional tests documented, executed and passed

| | |
|---|-------------------------------------|
| [BCON-25] Handle Connection State Change | |
| - Drop Created: 11/Sep/13 Updated: 21/Oct/13 Resolved: 21/Oct/13 | |
| Status: | Done |
| Project: | Bandwidth Connector |
| Component/s: | None |
| Affects Version/s: | None |
| Fix Version/s: | None |

| | | | |
|----------------------------|----------------|-------------------|----------------|
| Type: | Story | Priority: | Major |
| Reporter : | Steve McKinnon | Assignee : | Steve McKinnon |
| Resolution: | Done | Votes: | 0 |
| Labels: | None | | |
| Remaining Estimate: | Not Specified | | |
| Time Spent: | Not Specified | | |
| Original Estimate: | Not Specified | | |

| | |
|-------------------|---|
| Epic Link: | The Pure webRTC Application |
|-------------------|---|

Description

Intent: As any active BCON user I can end a communication session, and can expect my application to respond well when a communication session is ended

Description / Background

This story should make sure that the User Experience is handled appropriately for all end-of-session events, including...

- normal session termination via the GUI - either party
- deactivation scenarios such as...

- loss of connection
- browser exit
- application page exit
- logout (should have no impact)
- etc.

UI

The User experience should be predictable and informed for both parties in the communication for all reasonable termination scenarios

API

Operational Considerations

Exclusions and Limitations

Acceptance Criteria

- Enumeration of the end-of-session use cases
- Demonstration of controlled and informed UX behavior for the itemized conditions

| | | | |
|---|-------|---------------------|-------|
| [BCON-24] Naked URL Call initiation - user identification Created: 11/Sep/13 Updated: 17/Oct/13 Resolved: 17/Oct/13 | | | |
| Status: | | Done | |
| Project: | | Bandwidth Connector | |
| Component/s: | | None | |
| Affects Version/s: | | None | |
| Fix Version/s: | | None | |
| Type: | Story | Priority: | Major |

| | | | |
|----------------------------|----------------|------------------|----------------|
| Reporter: | Steve McKinnon | Assignee: | Steve McKinnon |
| Resolution: | Done | Votes: | 0 |
| Labels: | None | | |
| Remaining Estimate: | Not Specified | | |
| Time Spent: | Not Specified | | |
| Original Estimate: | Not Specified | | |

| | |
|-------------------|---|
| Epic Link: | The Pure webRTC Application |
|-------------------|---|

Description

Intent: When initiating a call through a naked URL there must be a way for the initiating user to identify themselves. The users name will be shown during the call

Description / Background

This story builds on naked URL call initiation for an anonymous user. The goal is to provide the user initiating the call with a way to identify themselves to the recipient of the call. The recipient of the call is already a registered user, so they do not need to identify themselves to the application. When a call is initiated, while waiting for the recipient to answer, the calling party must be able to either specify their name or authenticate with BC. The call will not take place, from a UX perspective, until the caller has identified themselves in some way.

UI

Caller

- during call initialization (before actually making an offer) the caller must be presented with some means of providing their name or a means to authenticate

with the system

- if a caller is already authenticated with the system then they must be shown who they are signed in as and be given the chance to re-authenticate as another user
- the call will not actually open until the user has identified themselves with either their name or authenticated with the system
- the recipients name, already known, will be shown during the call
- Recipient
- when receiving a call from another user, they will already be identified with a name or as another authenticated user
- the callers name will be shown during the call

API

- using existing API capabilities
- ability for a user to authenticate during call initiation
- ability for a user making a call to specify their name

Operational Considerations

Exclusions and Limitations

Acceptance Criteria

Demonstration of...

- clicking on a link that initiates a connection to the addressed party
- sane behavior in the case of a mangled address in the URL
- reasonable user experience in requesting the caller to identify themselves
- call only opening after the caller has identified themselves
- //handle case where recipient changes state (no longer online) after the call is being initiated //this isn't possible because it isn't possible to check status?
- showing the user name of both the caller and recipient of the call
- documentation updated
- functional tests documented, executed and passed

| | |
|---|-------------------------------------|
| anonymous Created: 11/Sep/13 Updated: 26/Sep/13 Resolved: 26/Sep/13 | |
| Status: | Done |
| Project: | Bandwidth Connector |
| Component/s: | None |
| Affects Version/s: | None |
| Fix Version/s: | None |

| | | | |
|----------------------------|--------------------------------|------------------|--------------------------------|
| Type: | Story | Priority: | Major |
| Reporter: | Steve McKinnon | Assignee: | Steve McKinnon |
| Resolution: | Done | Votes: | 0 |
| Labels: | None | | |
| Remaining Estimate: | Not Specified | | |
| Time Spent: | Not Specified | | |
| Original Estimate: | Not Specified | | |

| | |
|-------------------|---|
| Epic Link: | The Pure webRTC Application |
|-------------------|---|

Description

Intent: As any user in the internet, I can browse to a URL provided to me through some alternative means (email, IM, carrier pigeon) and be placed in communication with a webRTC endpoint specified by the URL

Description / Background

The core of this story is the launch of a client from a URL that automatically initiates

communication with a destination specified in the URL. This will cause a web-page to be served that manages the communication

UI

- much like the registered user UI
- no user identification or registration required
- no user authentication required for the initiating user
- reasonable means to provide call setup status feedback should be undertaken
- the anonymous nature of the initiating party should be communicated to the "far end"
- need the ability to end the communication, and to respond to the communication being ended from the far end.

API

- using existing API capabilities

Operational Considerations

Exclusions and Limitations

Acceptance Criteria

Demonstration of...

- clicking on a link that initiates a connection to the addressed party
- sane behavior in the case of a mangled address in the URL
- reasonable user experience feedback during the establishment of the communication
- documentation updated
- functional tests documented, executed and passed

[BCON-21] Receive Call Window - Simple

Case Created: 11/Sep/13 Updated: 26/Sep/13 Resolved:

26/Sep/13

| | |
|--------------------|-------------------------------------|
| Status: | Done |
| Project: | Bandwidth Connector |
| Component/s: | None |
| Affects Version/s: | None |
| Fix Version/s: | None |

| | | | |
|---------------------|--------------------------------|-----------|--------------------------------|
| Type: | Story | Priority: | Major |
| Reporter: | Steve McKinnon | Assignee: | Steve McKinnon |
| Resolution: | Done | Votes: | 0 |
| Labels: | None | | |
| Remaining Estimate: | Not Specified | | |
| Time Spent: | Not Specified | | |
| Original Estimate: | Not Specified | | |

| | |
|--------------|--|
| Issue Links: | <div><div>Relates</div><div>relates to</div><div><div>B Call [</div><div>C User c</div><div>O Wind r</div><div>N ow - €</div><div>- Simpl</div><div>1 e</div><div>9 Case</div></div></div> |
| Epic Link: | The Pure webRTC Application |

Description

Intent: As a BC user can receive an incoming communication addressed to me when my browser focus is on the BC application

Description / Background

This is the simple basic case. The basic ability is to receive an incoming communication request, launching the modal dialog, displaying the incoming user identification, giving the user the chance to accept the incoming request (or not), presenting the audio and video in a quality user experience on acceptance of the communication request.

UI

- The UI should ...
- present a modal dialog for any incoming communication request
- provide the user with options about how to accept the communication
- if the communication is accepted, present the user with a clean user experience containing video windows
- establish voice exchange
- yield a user experience that the user will find positive

API

- The API to the Network Application server must support the various events that are required to yield a quality user experience

Operational Considerations

Exclusions and Limitations

- incoming communication requests while the browser is not focused is out of scope
- acceptance and management of multiple simultaneous communication windows is out of scope.

Acceptance Criteria

Closure of the sprint must demonstrate:

- A clean and professional User experience
- Presentation of an incoming communication request to a user with the BC application in focus on the browser
- Providing the accepting party the opportunity to accept the request
- providing the accepting party the opportunity to deny the request in user-friendly way / ways
- presentation of the name and ID of the other party to the user as part of the request
- allowing the user to end the communication session

| | |
|--|-------------------------------------|
| [BCON-20] Call User - Edge Cases Created: 11/Sep/13 Updated: 17/Oct/13 Resolved: 17/Oct/13 | |
| Status: | Done |
| Project: | Bandwidth Connector |
| Component/s: | None |
| Affects Version/s: | None |
| Fix Version/s: | None |

| | | | |
|----------------------------|--------------------------------|------------------|--------------------------------|
| Type: | Story | Priority: | Major |
| Reporter: | Steve McKinnon | Assignee: | Steve McKinnon |
| Resolution: | Done | Votes: | 0 |
| Labels: | None | | |
| Remaining Estimate: | Not Specified | | |
| Time Spent: | Not Specified | | |
| Original Estimate: | Not Specified | | |

Epic Link:

[The Pure webRTC Application](#)

Description

Intent: As a BCON user I can be confident that the communications that I establish will behave well under all conditions

Description / Background

This story is intended to cover the "edge cases" in communications when unusual events and states might otherwise inhibit the communications user experience. This story should cover the various user behaviors and error conditions that can occur when initiating communications. This story should cover items like:

- bad addresses
- missing addresses
- called user not active
- failure of far end to answer
- response timeouts and other system timeouts.
- Calling a user already in a call
- etc.

UI

The user Experience should present meaningful feedback and guidance on all events and conditions impacting the person establishing the communications.

API

Operational Considerations

Exclusions and Limitations and assumptions

- assume that there is a server hosting environment in place.

Acceptance Criteria

- List the various use cases that are covered

- demonstrate the listed use cases.
- documentation updated
- functional tests documented, executed and passed

| | |
|--|-------------------------------------|
| [BCON-19] Call User Window - Simple Case Created: 11/Sep/13 Updated: 26/Sep/13 Resolved: 26/Sep/13 | |
| Status: | Done |
| Project: | Bandwidth Connector |
| Component/s: | None |
| Affects Version/s: | None |
| Fix Version/s: | None |

| | | | |
|----------------------------|--------------------------------|------------------|--------------------------------|
| Type: | Story | Priority: | Major |
| Reporter: | Steve McKinnon | Assignee: | Steve McKinnon |
| Resolution: | Done | Votes: | 0 |
| Labels: | None | | |
| Remaining Estimate: | Not Specified | | |
| Time Spent: | Not Specified | | |
| Original Estimate: | Not Specified | | |

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|---------------------|--|
| Issue Links: | |
| | Relates relates to B Receive [C ve c |

| | |
|-------------------|---|
| | <p> O Call r N Wind € - ow - 2 Simpl 1 e Case </p> |
| Epic Link: | The Pure webRTC Application |

Description

Authenticated, with Far End Ready to receive

Intent: As a valid user of the BC system, I will be presented with a window/display element that will permit me to establish a call to another user by use of their user id

Description / Background

Note: Extensions to this basic story to allow calling by name are acceptable but not required.

Note: this story needs to be demonstrated along with [BCON-21](#). Both stories must be in the same sprint.

UI

The UI will present a field / drop-down / UI component that will allow a user to initiate communications with another addressed user. This UI must...

- be available only to authenticated users
- provide a mechanism for addressing the far end
- provide a mechanism for presenting success / failure / state information to the user during the various stages / events involved in the communication.

API

Operational Considerations

Exclusions and Limitations

Acceptance Criteria

- demonstrate accessing the communications initiation window, including the login / security / credentialling mechanism
- demonstrate the UI mechanism for entering the destination address
- demonstrate the initiation of an addressed call
- demonstrate the presentation of session state and error information

Comments

Comment by [Steve McKinnon](#) [12/Sep/13]

codependent

[BCON-16] [Directory Entry - Click to](#)

[Establish Communications](#) Created: 11/Sep/13

Updated: 17/Oct/13 Resolved: 17/Oct/13

Status: Done

Project: [Bandwidth Connector](#)

Component/s: None

Affects Version/s: None

Fix Version/s: None

| | | | |
|--------------------|--------------------------------|------------------|--------------------------------|
| Type: | Story | Priority: | Major |
| Reporter: | Steve McKinnon | Assignee: | Steve McKinnon |
| Resolution: | Done | Votes: | 0 |

| | | | |
|----------------------------|---------------|--|--|
| Labels: | None | | |
| Remaining Estimate: | Not Specified | | |
| Time Spent: | Not Specified | | |
| Original Estimate: | Not Specified | | |

| | |
|-------------------|---|
| Epic Link: | The Pure webRTC Application |
|-------------------|---|

Description

Intent: It should be possible to initiate a call from the directory listing of users. Some form of link to the call page for the listed user should be made available for clicking.

Description / Background

Prerequisite: having functional call initiation by anonymous users through the naked call URL.

When a user clicks on a link to call a user in the user directory they will be sent to the call page for that user.

UI

- The user directory must have a link (button, anchor, image) for each listed user that will send the current user to their call page.

API

- Existing URL call initiation

Operational Considerations

Exclusions and Limitations

Acceptance Criteria

- When the call link for a user in the directory is clicked, the user must be routed to the call page for that user.

| | |
|---|-------------------------------------|
| [BCON-15] Directory Display Created: 11/Sep/13 Updated: 17/Oct/13 Resolved: 17/Oct/13 | |
| Status: | Done |
| Project: | Bandwidth Connector |
| Component/s: | None |
| Affects Version/s: | None |
| Fix Version/s: | None |

| | | | |
|----------------------------|--------------------------------|------------------|--------------------------------|
| Type: | Story | Priority: | Major |
| Reporter: | Steve McKinnon | Assignee: | Steve McKinnon |
| Resolution: | Done | Votes: | 0 |
| Labels: | None | | |
| Remaining Estimate: | Not Specified | | |
| Time Spent: | Not Specified | | |
| Original Estimate: | Not Specified | | |

| | |
|-------------------|---|
| Epic Link: | The Pure webRTC Application |
|-------------------|---|

Description

Intent: as a BC user I can access a list of all users via the BC User Portal

Description / Background

UI

Key actions

- once signed into my profile, I will be presented with a table of all users, listing name, userid, and other pertinent information.
- User interface design (1 page or 2, etc.) is left as an exercise to the development team

API

Operational Considerations

Exclusions and Limitations

Acceptance Criteria

- demonstrate the ability to sign in and access a tabular directory of users
- demonstrate the fact that new users are added to the directory, and are visible on refresh of the directory page.
- filter functionality

[BCON-11] Profile Management - Display

User Info (R) Created: 11/Sep/13 Updated: 17/Oct/13

Resolved: 17/Oct/13

Status:

Done

Project:

[Bandwidth Connector](#)

| | |
|---------------------------|------|
| Component/s: | None |
| Affects Version/s: | None |
| Fix Version/s: | None |

| | | | |
|----------------------------|--------------------------------|------------------|--------------------------------|
| Type: | Story | Priority: | Major |
| Reporter: | Steve McKinnon | Assignee: | Steve McKinnon |
| Resolution: | Done | Votes: | 0 |
| Labels: | None | | |
| Remaining Estimate: | Not Specified | | |
| Time Spent: | Not Specified | | |
| Original Estimate: | Not Specified | | |

| | |
|-------------------|---|
| Epic Link: | The Pure webRTC Application |
|-------------------|---|

Description

Intent: as a BC user with valid credentials I can access the BC Profile portal and see my profile information

Description / Background

UI

Required actions:

- sign in with username and password
- be presented with my profile information in a Read-only manner.

API

Operational Considerations

Exclusions and Limitations

Acceptance Criteria

- demonstrate sign-in with valid credentials
 - show that the previously entered profile information is displayed.
- demonstrate rejection of invalid credentials

| | |
|---|-------------------------------------|
| [BCON-10] Profile Management - New User (C) Created: 11/Sep/13 Updated: 26/Sep/13 Resolved: 26/Sep/13 | |
| Status: | Done |
| Project: | Bandwidth Connector |
| Component/s: | None |
| Affects Version/s: | None |
| Fix Version/s: | None |

| | | | |
|----------------------------|--------------------------------|------------------|--------------------------------|
| Type: | Story | Priority: | Major |
| Reporter: | Steve McKinnon | Assignee: | Steve McKinnon |
| Resolution: | Done | Votes: | 0 |
| Labels: | None | | |
| Remaining Estimate: | Not Specified | | |
| Time Spent: | Not Specified | | |

| | | | |
|--------------------|---------------|--|--|
| Original Estimate: | Not Specified | | |
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| | |
|--------------|---|
| Issue Links: | <div>Cloners</div> <div>is cloned by</div> <div><div>B</div> Profil 1</div> <div><div>C</div> e c</div> <div><div>C</div> Mana</div> <div><div>N</div> game [</div> <div>- nt - c</div> <div><div>2</div> User</div> <div><div>8</div> Datab</div> <div>ase</div> |
| Epic Link: | <div>The Pure webRTC Application</div> |

Description

*Intent: As a person that wants to become a BC user, I can enter Name, ID, and password in a web page and have a profile created for me *

Description / Background

UI

Key actions:

- enter initial information
 - name
 - proposed user id
 - password candidate
 - email
- have entered information validated through simple criteria
 - no spaces in userid
 - characters suitable to basic mode authentication
- establish a record in some form of "database"

- set things up for subsequent secure authentication (store credentials)

API

Operational Considerations

- The level of "security" will be low, using HTTP Basic authentication / TLS

Exclusions and Limitations


Acceptance Criteria

- demonstrate the ability to fill out a request in a web page
- demonstrate confirmation of valid inputs
- demonstrate that the required information was entered in the chosen "database"
- demonstrate that invalid information is rejected with appropriate user feedback

| | |
|--|-------------------------------------|
| [BCON-8] [Design Spike] - Network Level Architecture Created: 03/Sep/13 Updated: 16/Sep/13 Resolved: 16/Sep/13 | |
| Status: | Done |
| Project: | Bandwidth Connector |
| Component/s: | None |
| Affects Version/s: | None |
| Fix Version/s: | None |

| | | | |
|--------------------|--------------------------------|------------------|--------------------------------|
| Type: | Story | Priority: | Major |
| Reporter: | Steve McKinnon | Assignee: | Steve McKinnon |
| Resolution: | Done | Votes: | 0 |
| Labels: | None | | |

| | | | |
|----------------------------|---------------|--|--|
| Remaining Estimate: | Not Specified | | |
| Time Spent: | Not Specified | | |
| Original Estimate: | Not Specified | | |

| | |
|---------------------|--|
| Attachments: |  architecture.png |
| Epic Link: | Master The Fundamentals |

Description

Should the static "web-server" be a component of the Signalling Relay Server. ?
What is the overall network-level architecture ?

Description

It is wise to understand the high level/component level architecture prior to choosing supporting technologies and writing code. This "design spike" encourages that dialog, convergence and capture.


Acceptance criteria:

- Network-level application architecture that describes partitioning and delegation of functionality
- component mapping to deployment architecture

| | |
|--|------|
| [BCON-7] Signalling Relay Server Created: 01/Sep/13 Updated: 16/Sep/13 Resolved: 16/Sep/13 | |
| Status: | Done |

| | |
|---------------------------|-------------------------------------|
| Project: | Bandwidth Connector |
| Component/s: | None |
| Affects Version/s: | None |
| Fix Version/s: | None |

| | | | |
|----------------------------|--------------------------------|------------------|--------------------------------|
| Type: | Story | Priority: | Major |
| Reporter: | Steve McKinnon | Assignee: | Steve McKinnon |
| Resolution: | Done | Votes: | 0 |
| Labels: | None | | |
| Remaining Estimate: | Not Specified | | |
| Time Spent: | Not Specified | | |
| Original Estimate: | Not Specified | | |

| | |
|---------------------|--|
| Attachments: |  Sprint 1 Websocket Communication.png |
| Epic Link: | Master The Fundamentals |

Description

Intent: As a BWC project member I can content myself that I can exchange signalling between statically addressed clients

Description / Background

- creation of a network capability to bounce messages from one client to the other
- webSockets is recommended
- no addressing is required. Messages can simply go to the other device that is "connected" to the signalling relay server

- signalling should be carried to devices that are "on the other side of" NATs and firewalls.

API

UI

Commercial Considerations

Operational Considerations

- No performance requirements have been established

Exceptions and Limitations

Acceptance Criteria

Demonstrate:

- establishment of webSockets (or similar) "sessions" between BWC web clients and a network server
- exchange of [arbitrary] messages between clients in a demonstration mode.
- some rational behavior if the signalling cannot be exchanged
- Test Case Capture and complete execution
- Documentation Updated as Required

| | |
|--|---------------------|
| [BCON-6] Add Video and Audio Media to the PeerConnection Created: 01/Sep/13 Updated: 26/Sep/13 Resolved: 26/Sep/13 | |
| Status: | Done |
| Project: | Bandwidth Connector |
| Component/s: | None |
| Affects Version/s: | None |

| | |
|-----------------------|------|
| Fix Version/s: | None |
|-----------------------|------|

| | | | |
|----------------------------|--------------------------------|------------------|--------------------------------|
| Type: | Story | Priority: | Major |
| Reporter: | Steve McKinnon | Assignee: | Steve McKinnon |
| Resolution: | Done | Votes: | 0 |
| Labels: | None | | |
| Remaining Estimate: | Not Specified | | |
| Time Spent: | Not Specified | | |
| Original Estimate: | Not Specified | | |

| | |
|-------------------|---|
| Epic Link: | Master The Fundamentals |
|-------------------|---|

Description

*Intent: As a BWC Connector User I can see the completion of the bi-directional session, and the establishment of a 2-way voice and video call *

Description / Background

This is where a good chunk of the heavy lifting may occur. The need is essentially to take the Peer Connection established by prior stories to complete the display of video and the exchange of voice.

- Default devices / browser defaults are OK

UI

- Present the Near-end Video (obtained from prior story)
- Present the Far-end Video
- seize control of the speakers and present audio

- capture and transmit microphone audio

Commercial Considerations

Operational Considerations

Exceptions and Limitations

- no error condition handling.

Acceptance Criteria


Demonstrate:

- establishment of a 2 way video call including presentation on the UI
- establishment of 2 way audio communication.
- Test Case Capture and complete execution
- Documentation Updated as Required

| | |
|---|-------------------------------------|
| [BCON-5] Establish a Peer Connection Created: 01/Sep/13 Updated: 16/Sep/13 Resolved: 16/Sep/13 | |
| Status: | Done |
| Project: | Bandwidth Connector |
| Component/s: | None |
| Affects Version/s: | None |
| Fix Version/s: | None |

| | | | |
|--------------------|--------------------------------|------------------|--------------------------------|
| Type: | Story | Priority: | Major |
| Reporter: | Steve McKinnon | Assignee: | Steve McKinnon |
| Resolution: | Done | Votes: | 0 |

| | | | |
|----------------------------|---------------|--|--|
| Labels: | None | | |
| Remaining Estimate: | Not Specified | | |
| Time Spent: | Not Specified | | |
| Original Estimate: | Not Specified | | |

| | |
|---------------------|--|
| Attachments: |  Sprint 1 Websocket Communication.png |
| Epic Link: | Master The Fundamentals |

Description

Intent: As a BWC developer I can see my BWC client exchanging webRTC session setup messaging with the far end client

Description / Background

Prior to getting media to flow, webRTC requires the establishment of a **peer connection** via the webRTC APIs, and via some mechanism for getting signalling messages between the client instances. This story will exploit the capability to exchange that signalling to establish a peer connection between two clients. No media is required for this story,

API

- use of the webRTC JavaScript APIs for webRTC/

UI

n/a

Commercial Considerations

Operational Considerations

Exceptions and Limitations


Acceptance Criteria

- Using trace tools demonstrate the negotiation of a completed webRTC PeerConnection
 - Offer Side
 - Answer Side
- Test Case Capture and complete execution
- Documentation Updated as Required

| | |
|---|-------------------------------------|
| [BCON-4] Serve The Client Created: 01/Sep/13 Updated: 16/Sep/13 Resolved: 16/Sep/13 | |
| Status: | Done |
| Project: | Bandwidth Connector |
| Component/s: | None |
| Affects Version/s: | None |
| Fix Version/s: | None |

| | | | |
|----------------------------|--------------------------------|------------------|--------------------------------|
| Type: | Story | Priority: | Major |
| Reporter: | Steve McKinnon | Assignee: | Steve McKinnon |
| Resolution: | Done | Votes: | 0 |
| Labels: | None | | |
| Remaining Estimate: | Not Specified | | |
| Time Spent: | Not Specified | | |

| | | | |
|---------------------------|---------------|--|--|
| Original Estimate: | Not Specified | | |
|---------------------------|---------------|--|--|

| | |
|---------------------|--|
| Attachments: |  Sprint 1 UI Home.png |
| Epic Link: | Master The Fundamentals |

Description

Intent: As a BWC user I can browse to a URL to be presented with a voice and video BWC client

Description / Background

This story achieves the serving / distribution of the client HTML that will eventually implement the very simple voice and video client.

- resolve the deployment architecture for serving the client code.
- deploy and serve a basic wireframe client.

UI

- wireframe UI as defined by the team to contain a near end and far end frame for video presentation
- a button to initiate communication
- all elements passive - functionality to be added by other stories

Architectural Considerations

- is this served from a cloud location, from the Relay Server AS, or from some other infrastructure
- are IP address space partitioning and addressability concerns important ?

Operational Considerations

Exceptions and Limitations

Acceptance Criteria

- Access to the selected BWC URL for the client wireframe UI
- Presentation of the BWC wireframe UI on a Chrome browser
 - (optional / stretch) presentation on a Mobile / Tablet device
- Test Case Capture and complete execution
- Documentation Updated as Required

Comments

Comment by [Steve McKinnon](#) [10/Sep/13]

As a hint leading into Thursday, make sure that you can say "yes" to all of the story criteria 😊

On Tue, Sep 10, 2013 at 10:25 PM, Andrew Ferko (JIRA) <

—

Steve McKinnon

IRIS Solutions Planner

smckinnon@bandwidth.com

919-238-1466 (w)


804-503-0091 (c)

[BCON-3] Local Video via the "webRTC" API

set Created: 01/Sep/13 Updated: 16/Sep/13 Resolved: 16/Sep/13

| | |
|---------------------------|-------------------------------------|
| Status: | Done |
| Project: | Bandwidth Connector |
| Component/s: | None |
| Affects Version/s: | None |
| Fix Version/s: | None |

| | | | |
|----------------------------|--------------------------------|------------------|--------------------------------|
| Type: | Story | Priority: | Major |
| Reporter: | Steve McKinnon | Assignee: | Steve McKinnon |
| Resolution: | Done | Votes: | 0 |
| Labels: | None | | |
| Remaining Estimate: | Not Specified | | |
| Time Spent: | Not Specified | | |
| Original Estimate: | Not Specified | | |

| | |
|---------------------|---|
| Attachments: |  Sprint 1 Video Chat.png |
| Epic Link: | Master The Fundamentals |

Description

Intent: As a User of the Bandwidth Connector Web Client I can see myself

Description / Background

There is an existing webRTC JavaScript API that is used to access and control the use of Local Media (voice / video) present on the device being used. This story will access the Camera resource and present the video from that camera to a component of the (Browsed) UI

API

- see getUserMedia in w3c

UI

The image from the user's camera will be presented to the user, using the wireframe or other preliminary webUI UI as a baseline.

Commercial Considerations

Operational Considerations

Exceptions and Limitations


Acceptance Criteria

- Demonstrate local video using the "webRTC" Local Media API
- Test Case Capture and complete execution
- Documentation Updated as Required

| | |
|---|-------------------------------------|
| [BCON-2] Choose and Document Development and Execution Environment choices Created: 01/Sep/13 Updated: 16/Sep/13 Resolved: 16/Sep/13 | |
| Status: | Done |
| Project: | Bandwidth Connector |
| Component/s: | None |
| Affects Version/s: | None |
| Fix Version/s: | None |

| | | | |
|--------------------|--------------------------------|------------------|--------------------------------|
| Type: | Story | Priority: | Major |
| Reporter: | Steve McKinnon | Assignee: | Steve McKinnon |
| Resolution: | Done | Votes: | 0 |

| | | | |
|----------------------------|---------------|--|--|
| Labels: | None | | |
| Remaining Estimate: | Not Specified | | |
| Time Spent: | Not Specified | | |
| Original Estimate: | Not Specified | | |

| | |
|---------------------|--|
| Attachments: |  FirstDraftofInterimProjectReport.pdf |
| Epic Link: | Master The Fundamentals |

Description

Intent: As a Developer on the Bandwidth Connector project I have all of the technology at my fingertips to execute the project

Description / Background

Description

API

UI

Commercial Considerations

Operational Considerations

Exceptions and Limitations

Acceptance Criteria

- Establishment of a Documentation Repository

- Documentation of the chosen technology choices for:
 - Development
 - Execution
 - Planning and Management

Comments

Comment by [Brandon Walker](#) [13/Sep/13]

The documentation repository is located in the public folder on Google Drive.

Comment by [Brandon Walker](#) [13/Sep/13]

Rough draft of requirements and tech
