MEASUREMENT OF AR COMMERCIAL PLATFORMS- INSTRUCTIONS

Group Members: Saurabh Purkar, Varshaa Shree

STEPS FOLLOWED FOR EXPERIMENTS RELATED TO BACKGROUND SERVER:

Analysis of Background Servers

We performed 3 different experiments as mentioned below

In experiment 01 was a single user experiment

- Open JOIN XR Application
- User A joins the meeting and mutes themselves
- Stand still for 1 minute
- Move around without moving hands for 1 minute
- Move around by moving hands for 1 minute
- Stay still for 1 minute

In experiment 02 which was a two user experiment with
User A moving and User B being steady

- Open JOIN XR Application
- User A joins the meeting and mutes themselves
- User B joins the meeting after 30 seconds and mutes themselves
- User A and B keep standing
- User A moves by keeping hand still whereas User B is still standing for 1 minute
- User A moves with hand movement whereas User B is still standing for 2 min
- User A stands User B stands

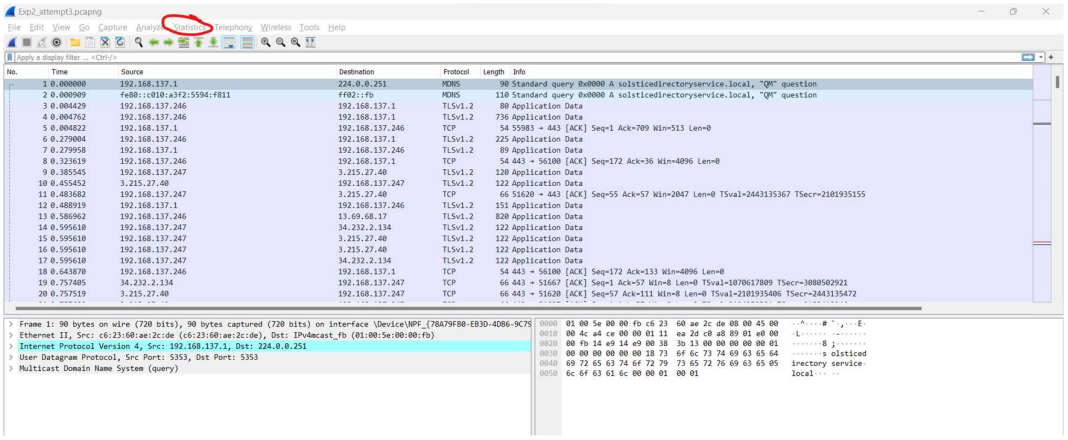
In experiment 03 which was a two user experiment where both
User A and User B are moving

Open JOIN XR Application

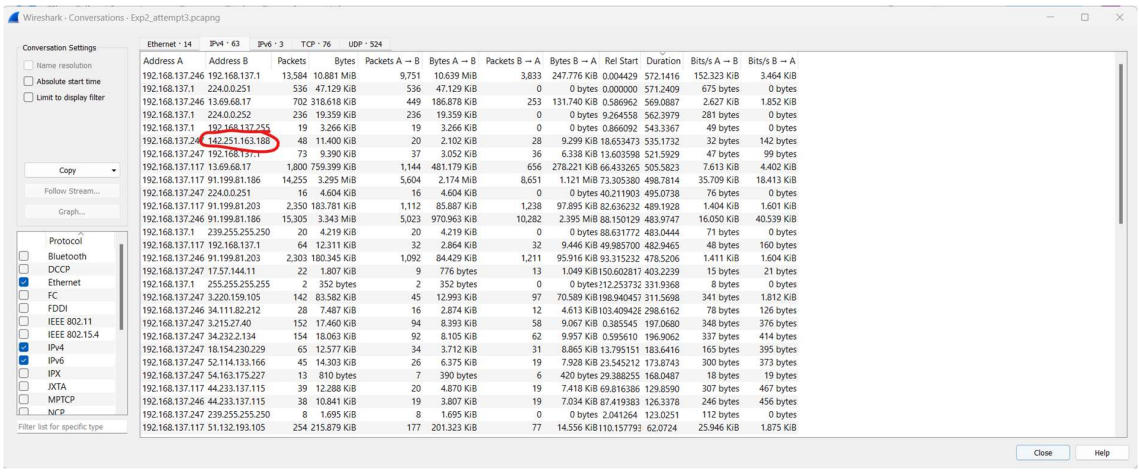
- User A joins the meeting and mutes themselves
- User B joins the meeting after 30 seconds and mutes themselves
- User A and B keep standing
- User A and User B move by keeping hand still for 1 minute
- User A and User B move with hand movement for 2 min
- User A stands User B stands

WIRESHARK ANALYSIS FOR ABOVE EXPERIMENTS:

- Go to Statistics in the Menu bar



- Press on conversations from the drop down
- Navigate to every tab with conversation the protocol used can like TCP or IPV4 can be determined based on tab heading
- Sort duration in descending order, consider only those conversation
- Consider those background servers where AddressA is hololens ip then Address B would be the background servers
- As shown in below figure where hololens ip is 192.168.137.247 so the background server is 142.251.163.188



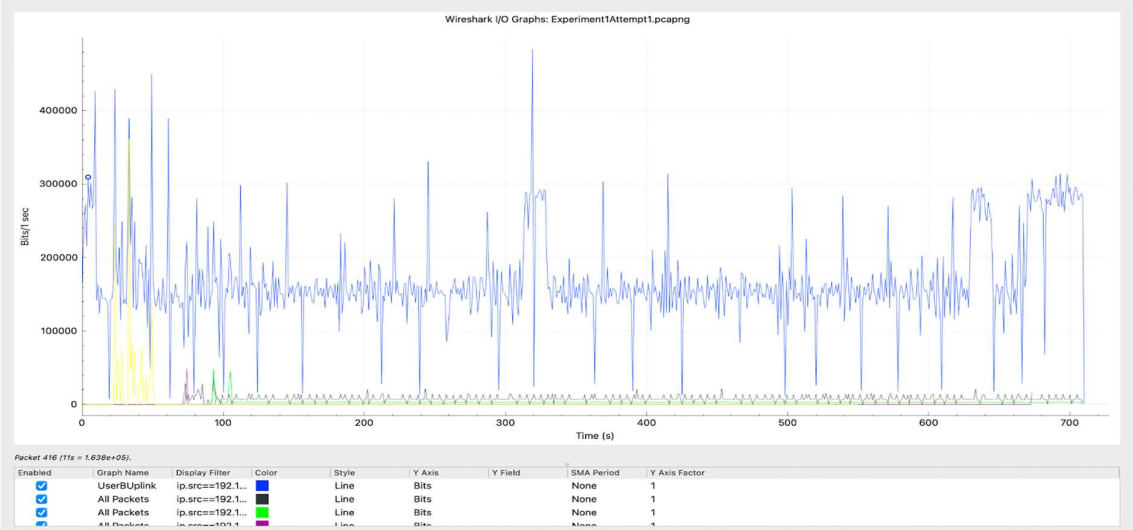
- Based on the conversation we built the table shown in below figure to fill the table we used below steps
    - To determine RTT used the ping command over the terminal using ping ip address
    - Data in bytes transferred in the conversation tab we used Bytes A -> B
    - Throughput is the value in the column Bytes in the conversation section
    - For duration we used the value from duration column in the conversation

Experiment 1 attempt 3 scenario Only user A is using JoinXR

Server (ip.dst==)	RTT	geolocation/server	Protocol	Anycast	Date time	Data(Bytes) WireShark	Throughput	Duration
91.199.81.186	20.404	Hamburg,Germany	HTTPS	yes	6th March	378.625 KiB	2.95KiB	473.1684
34.111.82.212	20.593	Kansas, united States	Https	Yes	6th March	7.349KiB	3.204KiB	18.3467
13.107.4.52	25.55	Redmond,Washington	Http	Yes	6th March	5.971KiB	34Bytes	465.14
13.69.68.17		Amsterdam, Europe	HTTPS	No	6th March	742.429 KiB	7.813KiB	465.1407

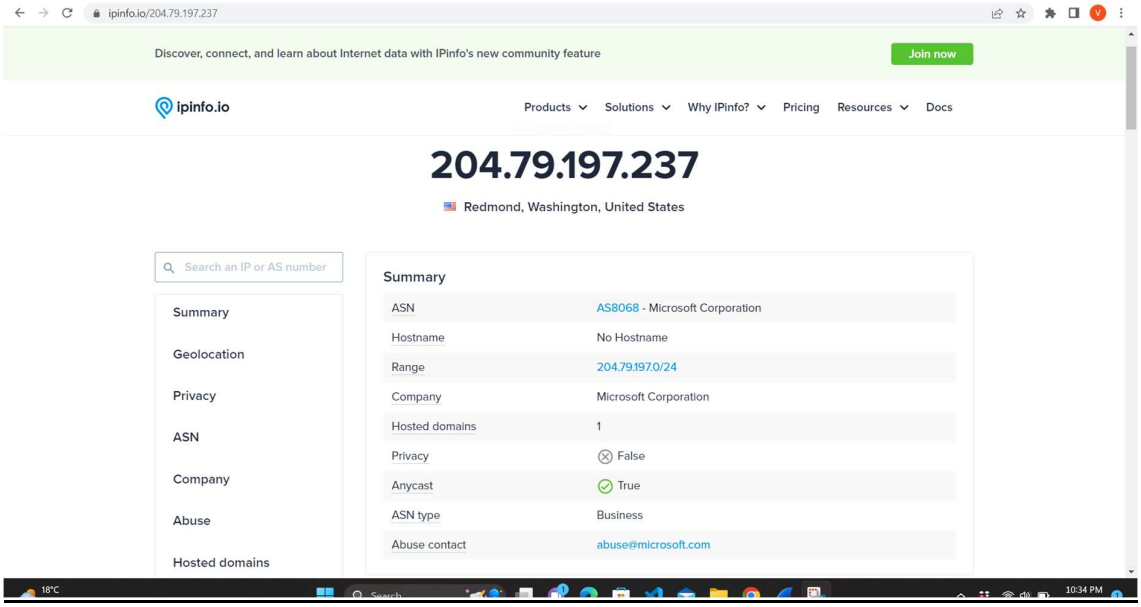
I/O Analysis

- Go to Statistics I/O Graphs
- You will get a new tab with many lines in graph format
- Now add filter in the display filter column
- Ip.src == hololens ip and ip.dst == background server ip got from previous steps
- After applying this filter you will have graph filtered based on above values
- Make sure Y-Axis column is Bits



IPINFO ANALYSIS OF BACKGROUND SERVERS:

- Next, we went to website https://ipinfo.io/ to determine location, anycast details for the server
- Based on the background server we obtained from conversation you can just append to the above link for example if the background server is 204.79.197.237 the the link would be https://ipinfo.io/204.79.197.237 on hitting the link you would find information like anycast details, location details as shown in below figure



Use of Device Portal for CPU GPU Utilisation

- For connecting to device portal on the hololens go to Security -> Developer Setting -> Enable device portal
- Hit the hololens ip provided once you hit enable device portal
- You will get the CPU and GPU values in graph format

Analysis of Latency with VPN

VPN Usage:
The VPN used is an application called VPN Shield available on Microsoft Store.

- Open VPN Shield
- Choose the country
- Click on connect
- Once VPN shows connected start exp[eriment

Analysis of start and stop of a shared video over various countries with variations in Avatar

Steps:

- Run a millisecond clock (this is done for synchronization)
- Join a JOINXR Meeting
- Start recording the video, make sure the millisecond clock is part of your video
- Start the VPN onUser B Hololens
- User A shares the video
- User A starts and pauses the video
- User B starts and pauses the Video

Below are screenshots of User A and User B at 06:37:18:598 with millisecond clock
USER A:

USER B:

Variations

- The first variation was to check the experiment results where both users were without any photo on avatar.
- The second variant was to check the experiment results with both users having a photo on avatar.
- Last variant was mixed scenario was where one user had avatar and other user did not have any avatar

Description of Variation 01: NO Avatar on both Users

- This is the default case provided by JoinXR
- In this case both users do not have images and are shown as 3D figures like below

Avatar without Photo

- Do the above mentioned steps with both Users having avatars like above

Description of Variation 02: Both UserHave photos on Avatar

- For this variant got to website https://join.fracturereality.io/ go to Profile section
- Click the change button
- Upload a photo and you will update your avatar with photo as shown below
- For this variation you need to update photo for both users from both their accounts
- Do the steps mentioned for starting and pausing video mentioned steps with both Users having avatars like below that is with photo

Avatar with photo

Description of Variation 03: One User has photo on Avatar and other one does not

- For this variant got to website https://join.fracturereality.io/ go to Profile section
- Click the change button
- Upload a photo and you will update your avatar with photo as shown below
- For this variation you need to update photo for one user only the other user will have the default avatar
- Do the steps mentioned for starting and pausing video mentioned steps with one user having avatar other not having avatar

Analysis of Latency for tool Dictation in JoinXR with meeting and drop-in

- Run a millisecond clock (this is done for synchronisation)
- Join a JOINXR Meeting
- Start recording the video, make sure the millisecond clock is part of your video
- Open dictation tool
- Make sure the dictation is visible for you and other users
- Start dictating
- Check which frame had first appearance for you and for the same for your partner to calculate latency

FFMPEG:

To convert video into frames we used FFMPEG Tool.
We used the command: ffmpeg -i input.mp4 out%d.png to generate the image frames.
Post this we checked which frame had first appearance for you and for the same for your partner to calculate latency