Video Communications on the Go

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Overview

- Who we are
- The state of mobile video calling today
  - Interoperability of videophones
  - Testing results
- Sample of video calls
- Battery tests
  - Idle 6 hours test
  - 10 minutes in call test

Who we are

- The Technology Access Program is a deaf-led research center at Gallaudet University
- Research areas:
  - Telecommunications access
  - Videoconferencing access
  - 9-1-1 access
  - Hearing aid compatibility of phones
  - And other technology access issues

- Which phone? iPhone or Android i.e. Samsung?
- What mobile VRS app do you use for video calls?
  - nTouch?
  - ZVRS Z5?
  - Purple P3?
  - Convo?
  - CAAGVRS?
  - GXPro?

- Do you use VRS or mainstream mobile apps for video calls?
  - VRS app on your mobile
  - FaceTime
  - Skype
  - ooVoo
  - Tango
  - Fring
  - Other?

It is worth remembering what the purpose of VRS and mobile video calls is: Functional equivalence

Can deaf and hard of hearing people use telecommunication services in the same unrestricted manner and at the same costs as hearing people?
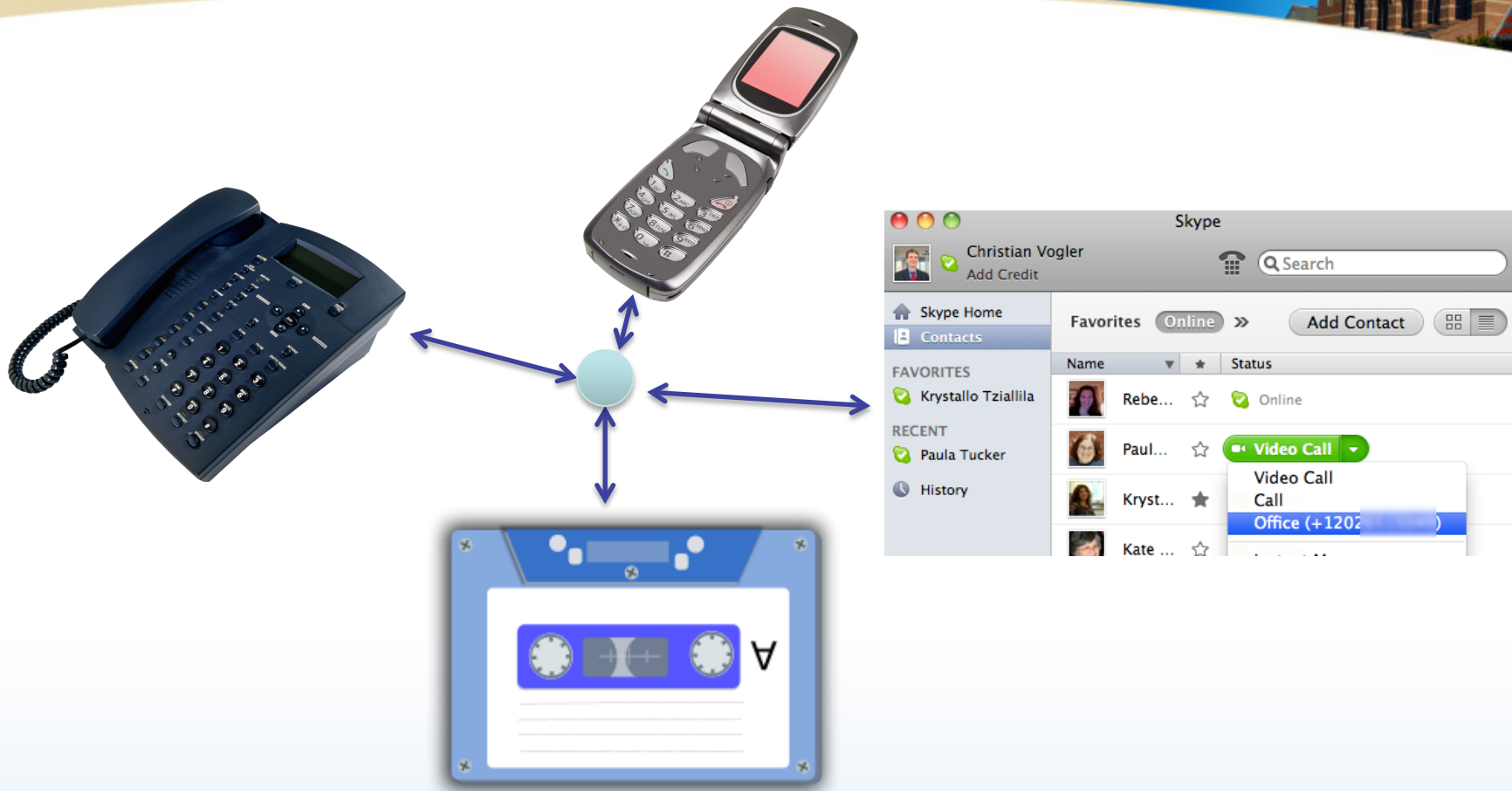
- Do we have it today?

- Do you feel that we have equal access compared to the mainstream?

- Interoperability is a big barrier for us in the video calling world.
  - Interoperability: devices from different vendors and providers work with each other.
- See what hearing callers can do:

Hearing callers can call each other with landline phones, mobile phones, Internet software, and leave messages via answering machines/voicemail. It just works.

Interoperability testing

- Tested devices, software and apps from 6 VRS providers: CAAG, Convo, Global VRS, Purple, Sorenson, and ZVRS

- Also tested three stand alone devices: Purple's Smart VP, Sorenson nTouch VP and ZVRS's Z20 to verify if they can receive mobile calls

Interoperability testing

- Last year at the NAD conference, we showed that mobile VRS interoperability was bad.

- Has this changed?

- We ran tests to find out -

Call Test Matrix

308 TOTAL CALLS   (CALL= Live call test, ANS= Answering machine test)

From App	CAAGVRS Mobile Galaxy	CAAGVRS Mobile iPad 2	Convo Mobile Galaxy	Convo Mobile iPad 2	GlobalVRS GXPro Galaxy	Sorenson nTouch Galaxy	Sorenson nTouch iPad 2	Purple P3 Mobile Galaxy	Purple P3 Mobile iPad 2	ZVRS Z4 Galaxy	ZVRS Z5 iPad 2	Sorenson nTouch VP	ZVRS Z20	Purple SmartVI
CAAGVRS Mobile Samsung S3	CALL: ✔7 / ANS: ✗1	CALL: ✔7 / ANS: ✗1	CALL: ✔7 / ANS: ✔7	CALL: ✔7 / ANS: ✔7	CALL: ✗2 / ANS: ✗2	CALL: ✔7 / ANS: ✗6	CALL: ✔7 / ANS: ✗6	CALL: ✔7 / ANS: ✔7	CALL: ✔7 / ANS: ✔7	CALL: ✔7 / ANS: ✔7	CALL: ✔7 / ANS: ✔7	CALL: ✔7 / ANS: ✗6	CALL: ✔7 / ANS: ✔7	CALL: ✔7 / ANS: ✔7
CAAGVRS Mobile iPhone 5	10,13 / ANS: ✗1	10,13 / ANS: ✗1	CALL: ✔7 / ANS: ✔7	CALL: ✔7 / ANS: ✔7	CALL: ✗2 / ANS: ✗2	CALL: ✔7 / ANS: ✗6	CALL: ✔7 / ANS: ✗6	CALL: ✔7 / ANS: ✔7	CALL: ✔7 / ANS: ✔7	CALL: ✔7 / ANS: ✔7	CALL: ✔7 / ANS: ✔7	CALL: ✔ / ANS: ✗6	CALL: ✔7 / ANS: ✔7	CALL: ✔7 / ANS: ✔7
Convo Mobile Samsung S3	CALL: ✗2 / ANS: ✗2	CALL: ✗2 / ANS: ✗2	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✔	CALL: ✗2 / ANS: ✗2	CALL: ✔ / ANS: ✗6	CALL: ✔ / ANS: ✗6	CALL: ✗5 / ANS: ✗5	CALL: ✗5 / ANS: ✗5	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✗6	CALL: ✔ / ANS: ✔	CALL: ✗5 / ANS: ✗5
Convo Mobile iPhone 5	CALL: ✗2 / ANS: ✗2	CALL: ✗2 / ANS: ✗2	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✔	CALL: ✗2 / ANS: ✗2	CALL: ✔ / ANS: ✗6	CALL: ✔ / ANS: ✗6	CALL: ✗5 / ANS: ✗5	CALL: ✗5 / ANS: ✗5	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✗6	CALL: ✔ / ANS: ✔	CALL: ✗5 / ANS: ✗5
GlobalVRS GXPro Samsung S3	CALL: ✔ / ANS: ✗1	CALL: ✔ / ANS: ✗1	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✔	CALL: ✗2 / ANS: ✗2	CALL: ✔ / ANS: ✗6	CALL: ✔ / ANS: ✗6	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✗6	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✔
Sorenson nTouch Samsung S3	CALL: ✗12 / ANS: ✗1	CALL: ✗12 / ANS: ✗1	CALL: ✗13 / ANS: ✗11	CALL: ✗13 / ANS: ✗11	CALL: ✗2 / ANS: ✗2	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✔	CALL: ✗2 / ANS: ✗2	CALL: ✗2 / ANS: ✗2	CALL: ✔ / ANS: ✗11	CALL: ✔ / ANS: ✗11	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✗11	CALL: ✗2 / ANS: ✗2
Sorenson nTouch iPhone 5	CALL: ✗13 / ANS: ✗1	CALL: ✗12 / ANS: ✗1	CALL: ✗13 / ANS: ✗11	CALL: ✗13 / ANS: ✗11	CALL: ✗2 / ANS: ✗2	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✗11	CALL: ✔ / ANS: ✗11	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✗11	CALL: ✗12 / ANS: ✔
Purple P3 Mobile Samsung S3	CALL: ✔ / ANS: ✗1	7,4 / ANS: ✗1	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✔	CALL: ✗2 / ANS: ✗2	CALL: ✔ / ANS: ✗6	CALL: ✔ / ANS: ✗6	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✗6	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✔
Purple P3 Mobile iPhone 5	CALL: ✔ / ANS: ✗1	7,4 / ANS: ✗1	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✔	CALL: ✗2 / ANS: ✗2	CALL: ✔ / ANS: ✗6	CALL: ✔ / ANS: ✗6	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✗6	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✔
ZVRS Z4 Samsung S3	CALL: ✔ / ANS: ✗1	7,4 / ANS: ✗1	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✔	CALL: ✗2 / ANS: ✗2	CALL: ✔ / ANS: ✗6	CALL: ✔ / ANS: ✗6	CALL: ✔ / ANS: ✗9	CALL: ✔ / ANS: ✗9	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✗6	CALL: ✗10 / ANS: ✔	CALL: ✔ / ANS: ✗9
ZVRS Z5 iPhone 5	CALL: ✔ / ANS: ✗8	7,4 / ANS: ✗8	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✔	CALL: ✗3 / ANS: ✗3	CALL: ✔ / ANS: ✗8	CALL: ✔ / ANS: ✗8	CALL: ✔ / ANS: ✗9	CALL: ✔ / ANS: ✗9	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✗8	CALL: ✔ / ANS: ✔	CALL: ✔ / ANS: ✗10

ISSUE INDEX:

#1: Provider do not have answering machine service
#2: Never rang - immediately disconnected
#3: Similar to #2 but stucks at dialtone message
#4: Self view flipped on called device
#5: Connects to Purple VRS interpreter - point to point call fails
#6: Disconnected instead of reaching to answering machine
#7: Works but takes 7 seconds or more before two way video shows up
#8: Calling device still shows ringing on disconnected calls
#9: Black incoming video of greeting recording on calling device
#10: Black incoming video on calling device
#11: Video mail greeting worked but froze after greeting ends
#12: Incoming video froze immediately seen on called device
#13: Incoming black video seen on called device

- Test live call from and to each device/app

- Test leaving message on answering machine
  - Press "reject call" on answering phone to force answering machine on
  - One limitation: Some phones may behave differently if you just let the call ring – but this would have taken too long for all calls

Testing method

- 11 x 14 (11 app + 3 VPs) = 308 calls total

- All calls use either Wifi or Ethernet. No cellular test calls are used

- WiFi tests were done on consumer-grade routers typical of homes for each side of mobile test calls (2 routers)

- Each side of call tests uses different Wifi router behind NAT and a different public IP address to simulate real world

Interoperability Issues

- Some highlights:
    - Mobile apps have improved since last year
    - Live calls work better than leaving messages

- Full results on our web site (link is shown on final slide)

- Convo:
  - Calling to any Purple videophone resulted in Purple VRS call instead of point to point calls
  - Receiving nTouch mobile calls caused black video on Convo side
  - Convo app making calls to CAAGVRS app did not ring

Interoperability Issues

- CAAGVRS:
  - CAAGVRS iOS app calling to either iOS or Android app of CAAGVRS resulted into black videos
  - Convo app calling to CAAGVRS apps did not ring
  - No answering machine offered for CAAGVRS customers
  - Black video seen on CAAGVRS apps from nTouch app calls

- Global VRS:
  - Can not receive calls in our test accounts but can make calls fine
  - No answering machine offered for CAAGVRS customers

Interoperability Issues

- Purple:
  - Convo calling to any Purple videophone resulted in Purple VRS call instead of point to point calls
  - Can't receive nTouch Android calls
  - ZVRS callers can't see Purple answering machine greetings

- Sorenson:
  - Unable to accept messages on answering machine from non-Sorenson callers
  - ZVRS answering machine greeting gets stuck on CONNECTING TO ANSWERING MACHINE graphic
  - Receiving mobile calls from nTouch mobile calls caused black video on Convo
  - nTouch Android calls can't connect to Purple mobile apps and Purple SmartVP (iOS nTouch worked fine)

Interoperability Issues

- ZVRS:
  - Z4 Android to Z20 resulted black video on Z4 side. Was told Z5 Android will solve this soon.
  - Black video on ZVRS app/device of Purple answering machine greetings
  - nTouch calls leaving answering machine on ZVRS will get stuck on "CONNECTING TO ANSWERING MACHINE" graphic
  - Z5 mobile on iPhone/iPad calls get stuck with RINGING or DIALTONE message on completed calls to providers without answering machine

- Videophone does not ring
  - … you have no idea that someone called
- Black/green screen
  - … the caller can't see you or vice versa
- Poor video
  - … you can't do conversation well
- Answering machine does not work
  - … people can't leave messages for you

Success rate of making live calls:

- Convo: 16 out of 26
- CAAG VRS: 24 out of 26
- **Global VRS: 13 out of 13**
- Sorenson: 14 out of 26
- **Purple: 26 out of 26**
- ZVRS: 25 out of 26

Note: Calling to Global VRS not counted because of test accounts issues

Success rate of receiving live calls:

- Convo: 18 out of 22

- CAAG VRS: 12 out of 22

- Global VRS: 0 out of 11

- **Sorenson: 33 out of 33**

- Purple: 23 out of 33

- ZVRS: 32 out of 33

Success rate of leaving messages on answering machines:

- Convo: 10 out of 26
- **CAAG VRS: 16 out of 26**
- **Global VRS: 8 out of 13**
- Sorenson: 9 out of 26
- **Purple: 16 out of 26**
- ZVRS: 10 out of 26

Note: Calling to Global VRS not counted because of test accounts issues

Success rate of taking answering machine messages:

- **Convo: 18 out of 22**
- CAAG VRS: does not offer answering machine
- Global VRS: does not offer answering machine
- Sorenson: 6 out of 33
- Purple: 18 out of 33
- **ZVRS: 27 out of 33**

Short Demo

- The next slide will have a video playing of selected VRS app calling to either ZVRS's Z20 or Sorenson's nVP.

- The video will show the quality received from the stand alone VP to the selected VRS app. Not all are the same.

- Videos are not sharp as it should be because of a video camera recording off a phone.

Short demo

- Interoperability among mobiles has improved since last year
  - But still is worse than with standalone VPs
- Data bandwidth and data caps (2 GB is just 2-4 hours of calling time)
- Android support has improved since last year, but still lags months behind iOS
  - Fragmentation in cameras, screens, and CPUs
  - At least now most popular phones work

Battery life

- Some people think: VRS apps drain your batteries very quickly

- That is, you can't leave them always on.

- **Is that still true???**

We ran two battery life tests in this enviroment:

– Strong Wifi signal is used

– Killed all running apps except for selected VRS

– Bluetooth and mobile data were turned off

– Runs on battery only.

– Video call tests used a common looping video on a Mac screen

- Phone cameras were pointed at it

– Two different tests: Idle and in-call.

Idle Battery Life

Idle tests (6 hours) for iPhone 5:

- **iPhone (No VRS App)** 2% drop

- **iPhone Z5** 1% drop

- **iPhone Purple** 2% drop

- **iPhone CAAG** 0% drop

- **iPhone Sorenson** 0% drop

All are about the same of using battery while in good Wifi signal. Cellular use on battery may vary.

Idle tests (6 hours) for Samsung S3:

- **S3 (No VRS App)** 11% drop
- **S3 Z4** 14% drop
- **S3 Convo** 16% drop
- **S3 Purple** 20% drop
- **S3 CAAG** 9% drop
- **S3 Sorenson** 16% drop

There were some Android processes we couldn't control. Cellular use on battery may vary.

In Call tests (10 minute) for iPhone 5 & iPad 2:

- **iPhone Convo** 7% drop

- **iPhone Purple** 5% drop

- **iPhone CAAG** 6% drop

- **iPhone Sorenson** 5% drop

- **iPhone Z5** 5% drop

- **iPhone Facetime** 6% drop

- **iPad Facetime** 0% drop

In Call tests (10 minutes) for Samsung S3 & Nexus 7 Tablet:

- **S3 Z4** 6% drop
- **S3 Convo** 6% drop
- **S3 Purple** 5% drop
- **S3 CAAG** 6% drop
- **S3 Sorenson** 4% drop
- **S3 GoogleTalk** 6% drop
- **Nexus 7 Tablet GoogleTalk** 3% drop

- On iPhones, we saw no difference between leaving the VRS app always on in the background and turning it off.

- On Android, VRS apps still eat battery life in the background (but not very much: 6-10% over 6 hours).

- We saw no difference between VRS and native apps for battery use **during** calls

- **Caution:** These were Wifi tests – cellular behavior may be different

- **Caution:** We did not test if the VRS app still was functioning after 6 hours in the background

Battery life tips

- To save battery, it is a good idea to kill all applications that are not needed. Use texting to agree for a video one to one calls. Run VRS app for making calls and for expecting video calls.

- Both VRS and native video calls (Facetime, Google Hangouts) drain the battery – 30% per hour – or just 2 to 3 hours of calling time on Wifi.
  - Compare to over 10 hours for voice calls
  - Is that functionally equivalent?

- Fixing battery life during video calls needs to be a priority.

Acknowledgments

- Questions? Comments?
- Supplemental material:
  http://tap.gallaudet.edu/Conferences/TDI2013/