WebRTC on the Edge - for video calls and devices.

AKA: Future WebRTC usage will not be server based

Tim Panton (tim@pi.pe) Oct 2021

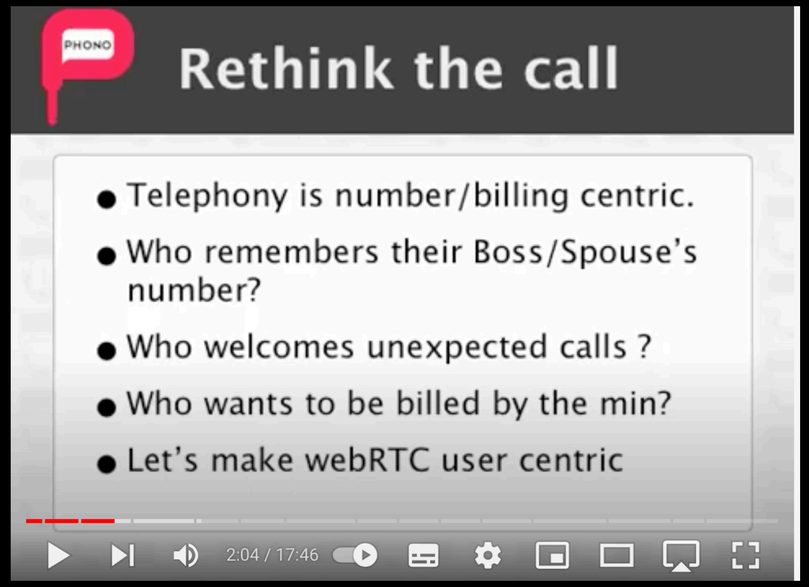
Tim Panton

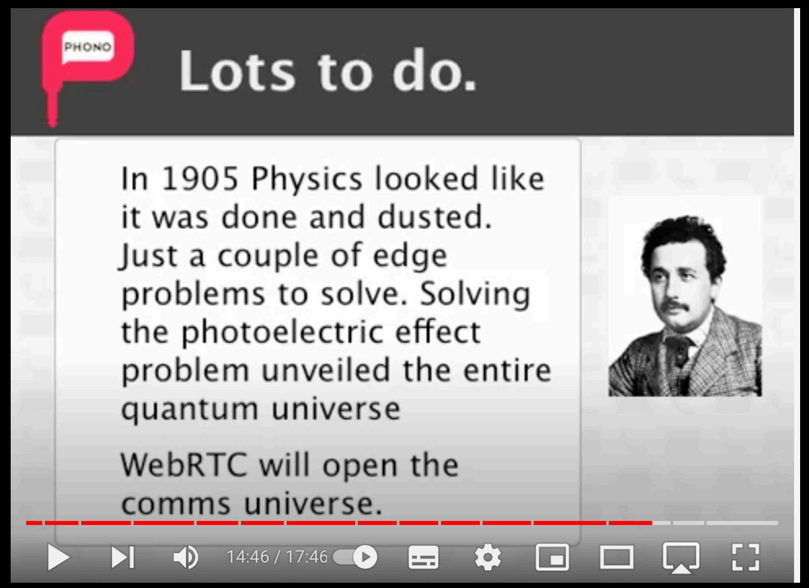
CTO @ pi.pe GmbH

- |pipe| licenses a lightweight cleanroom WebRTC stack for IoT devices.
- cofounded a web-based telephony company, sold the IPR to Tropo Inc., which was then acquired by Cisco.
- technical cofounder of Westpoint, a web security company acquired by Capita.
- writes |pipe| software
- helps define WebRTC standards at the W3C and IETF

Hindsight
(It is a wonderful thing)

- 9 years ago I presented here.
- About WebRTC
- I wasn’t wrong
- I wasn’t completely right.
- WebRTC did change things,
- So did mobile Apps.
- Telephony didn’t.





What is next?

My guesses…

Video conferencing will move off webRTC

Centralised cloud based services will switch to webTransport

- The ability to do ‘everything’ over QUIC is compelling
- One set of load balancers
- Simplified firewall rules
- Better job prospects for engineers
- Overlap with CDN/streaming services

- BUT. This transition will take a while.

The End for WebRTC?

Probably not - it will move to the edge

- Rising local bandwidth (5g/wifi6/fttp)
- Increasing in-browser access to system resources (AI, GPU etc)
- Rising energy costs (Cooling will push CPU usage to edge)
- Increased locality of calls (cross town not ocean)
- Increasing censorship/permission problems (banned from Youtube)
- Demand for customised experiences (Especially rich audio)
- Capability of endpoints (e.g. mobile)

WebRTC : P2P + Edge-to-Edge

The Snowden Legacy

- NAT traversal
- E2e encryption (when P2P)
- Largely permission-less - you just need a website
- Randomised ports + DTLS/SRTP
- PFS encryption
- Bandwidth estimation
- Lighter more flexible implementations than libwebrtc (pion, |pipe| etc.)

Which makes WebRTC ideal for small things….
Especially domestic IoT

What does this let us do?

Some examples.

(Hard to convey the experience in slides, but I'll try…)

IoT Cameras

Baby Monitors etc

Baby Monitor - features

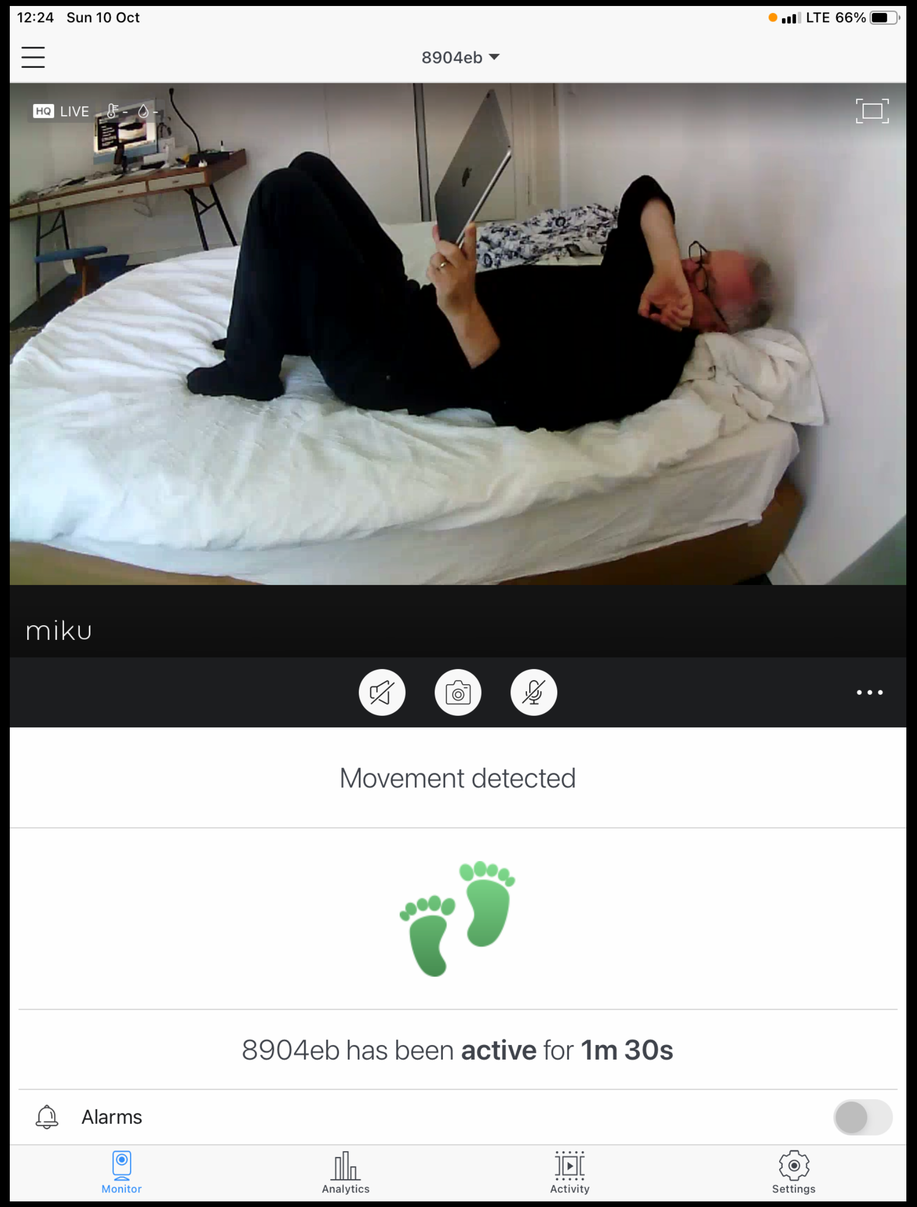
- Realtime
  - Audio/Video/Data
  - Stays local if possible
  - Encrypted E2E
- Key features work off-line (e.g. when ISP goes down)

  You can’t do this with webTransport!

Baby Monitor (tech)

|pipe| WebRTC on ARM SOC

- Eco friendly
  - ARM + H264 hardware encode
  - ARM crypto
  - Minimal cloud processing
- Privacy friendly
  - ICE finds local route
  - Encrypted E2E
  - Auth tokens local (|pipe| patent)



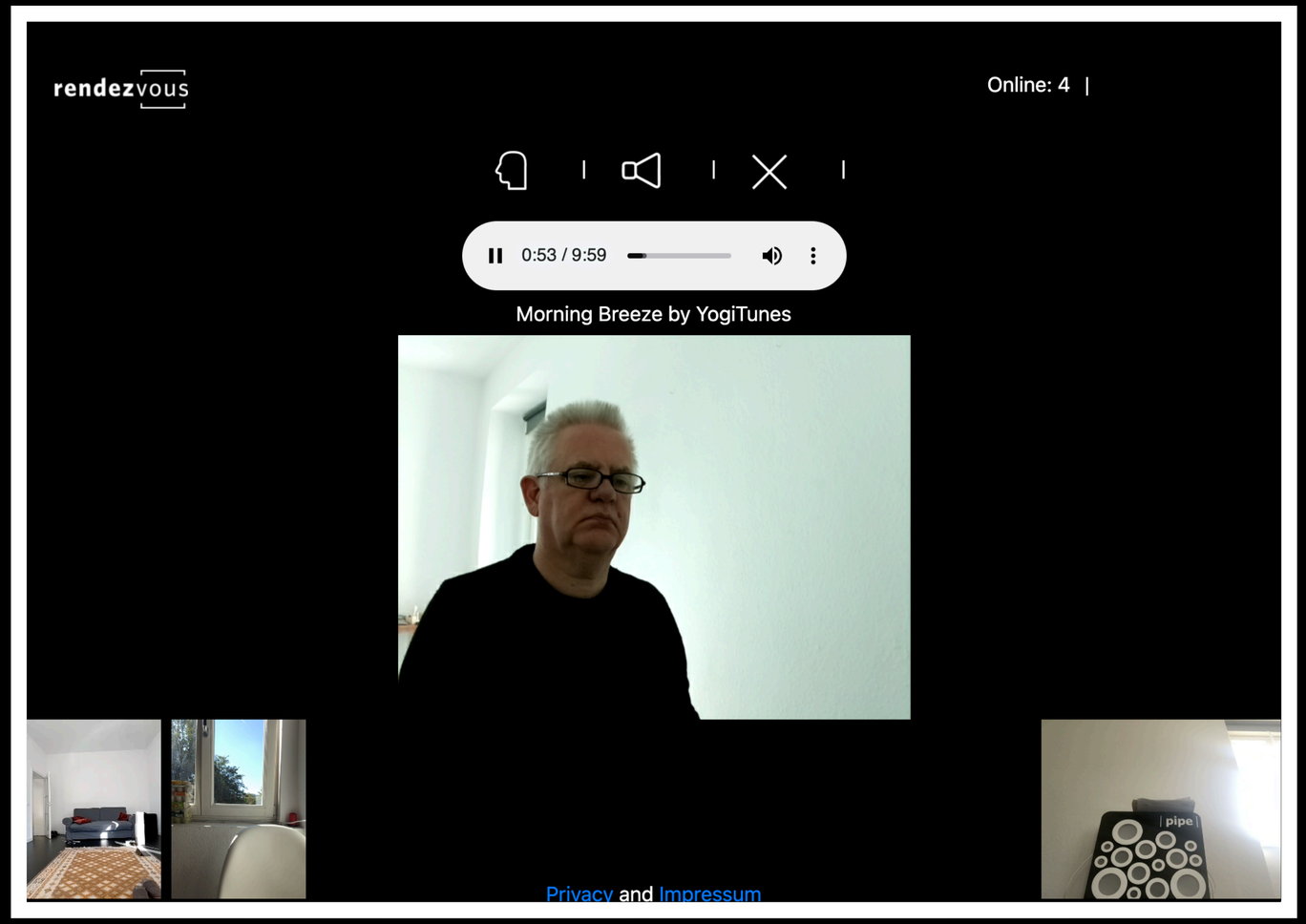
Teach Yoga

Live immersive audio/video for intimate small group lessons

Rendezvous.yoga

Tool for Yoga teachers

- Rich intimate audio
  + Licensed (YogiTunes) music
- Customised Video experience
  - Teacher -> Students
  - Students->Teacher
  - No student->student
  - Student <-> Teacher

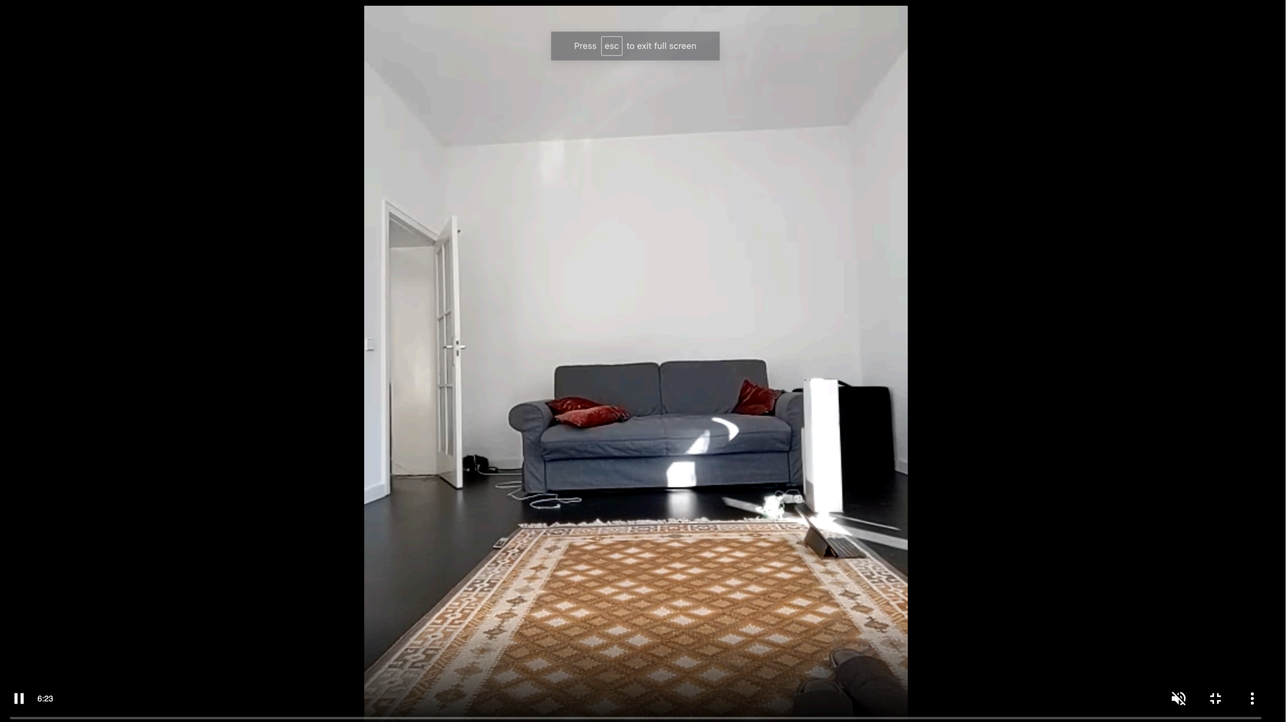


Teacher's view of multiple students with audio controls.

Rendezvous.yoga

Tool for Yoga teachers

- Web Audio + WebRTC:
  - Produce fake stereo n-1 mix
  - (licensed) Music in sync
- WebRTC + data channel:
  - Video selection/management
  - Multiplex connections to students.
- Browser acts as MCU
  No Cloud service needed.
  No permissions, apps, logins etc.



Teacher focussing on a single student.

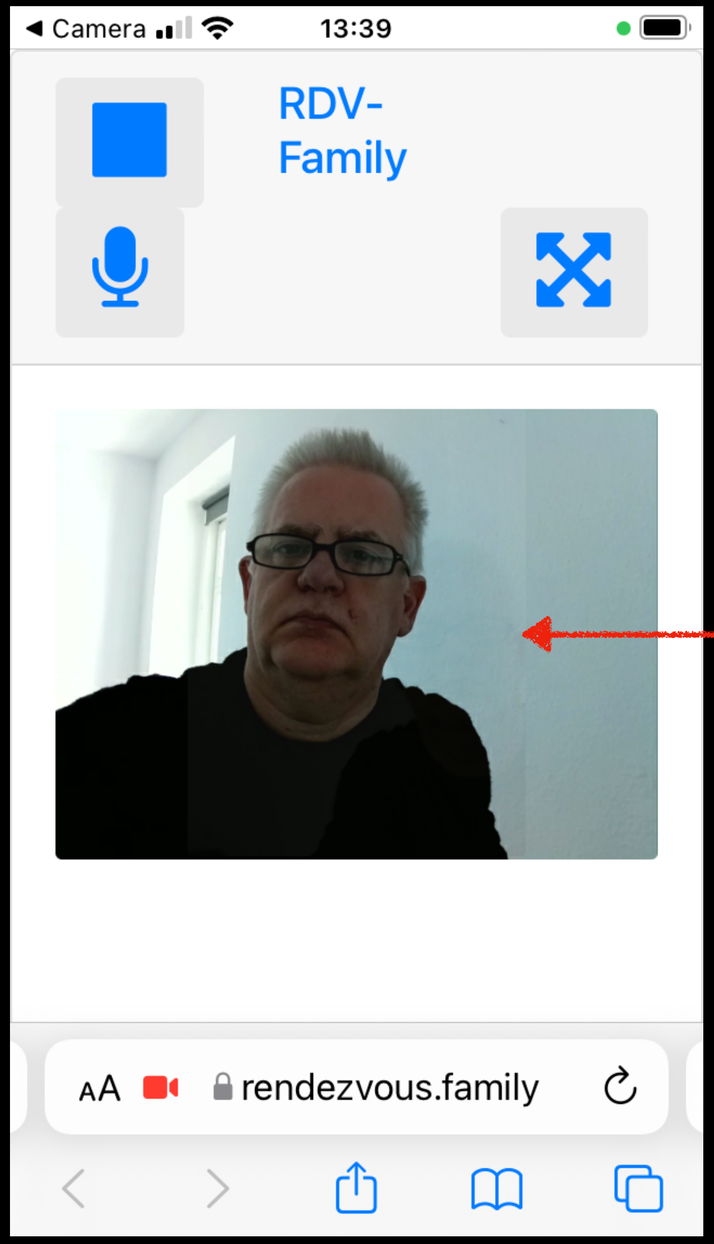
Chat across Silos

SMS driven Video calls between smartphone users

Rendezvous.family

Open source cross-silo chat

- Video call people via SMS
- Ideal for folks in the other ecosystem
- No install/setup
- Free to use (zero server costs)
- Works on all smartphones
- No self view (fake reflection)



Rendezvous.family

Open source cross-silo chat

- Pure standard WebRTC.
  platform independent.
- Uses canvas for ‘reflection’
- Static webpage
- Exchange invite over SMS
- Recipient sends offer (offer timeout)
- Camera/mic on smartphones
  are great these days.

Demo time

1 to many video with no server

What you saw
(Hopefully)

- Live video
- To 20+ users
- From a modified IoT camera (not the stock firmware)
- Using my vDSL
- No cloud processing (on device SFU)
- No central permissions (edge-to-edge security)
- Expect to see this in webcams and perhaps routers.

Summary

WebRTC will move to the edge and onto IoT

- Highly valued
- Niche experiences
- With great (intimate) audio
- Privacy
- Permissionless
- On your own bandwidth
- No servers needed

Questions and contacts

- tim@pi.pe
- https://rendezvous.berlin
- https://pi.pe
- Twitter: @pipe_iot
- GitHub: https://github.com/pipe