

Video Conferencing

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Admin

- HW 6
 - ❖ Due Next Wednesday
 - ❖ *Definitely do prob. 1*

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Dealing with Packet Loss

Queue monitoring - trying to keep a minimal set of packets around (deal w/ delay jitter)
Keep very delay from happening w/ smaller thresholds near top

queue's
threshold
is
at
8

- Typically 3-5% packet loss is considered "normal" for interactive video
 - . Use this for feedback (typically via RTCP)
 - > 3-5% loss, decrease quality to improve goodput
 - < 2% loss, increase quality
 - "reactive" approach - deal w/ it after it occurs
 - IPPPPPP.. I acknowledgements / retransmissions
 - limited use in interactive because low latency
 - retransmit missing I-frame data for example
 - "proactive" approach - introduce redundancy

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Retransmissions

↳ Typically a waste of time

- o) playout latency $\geq 1.5 \text{ RTT}$
 - ↳ Chance for it to be useful
- o) Retransmitting lost I-frame data
 - > Will need to deal with drift error



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Forward Error Correction

Deal with potential loss by sending additional data to correct it.

How much bandwidth for FEC vs. Data?

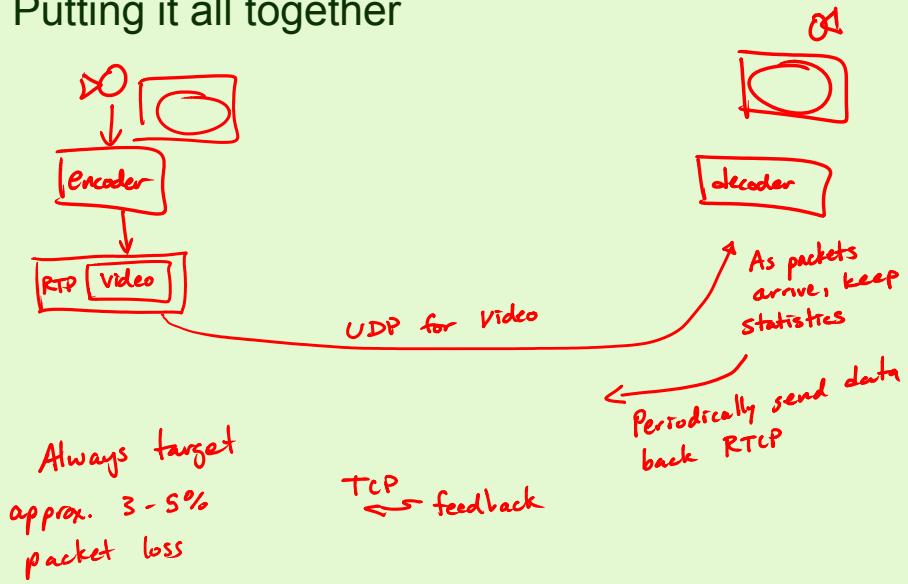


- Stagger original & redundant data as above
Really wasteful of resources.
Typically more for packet loss
- k-way XOR - assume minimal packet loss



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Putting it all together



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Umbrella Standards for Video Conferencing

Goad: any two end systems to be able to talk with each other, independent of hardware or software

ITU

Style Factors

Software

H.323 / SIP used for creation of video conferencing sessions between compliant devices

Necessary pieces:

How do you exchange admin messages?

How do we agree on video/audio?

What packet format?

How screens?

How many people?

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H.323

ITU - 1996

Was most widely deployed videoconferencing system
(SIP more common today)

Provides session layer protocol above RTP, UDP, IP
Connection negotiation/ establishment

Encompasses other standards

Need to have a base audio / video format
Mandatory to implement

H.261 video / G.711 audio (u-law)

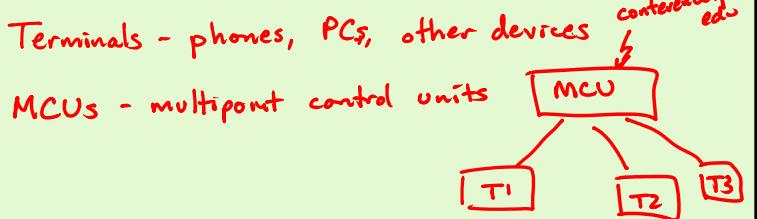
Optional

H.263 / H.264 video

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H.323

Entities:



Gateways - communicate w/ non-H.323 systems

H.323 ... GW ... SIP

Gate keeper - management functions for H.323 sessions

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H.323

H.323 compliant audio / video

Talk to other PC, gateway, or MCU

Microsoft NetMeeting Appl. → Polycom video conferencing.

Implementation

G.723 / G.711 for audio

H.263 / H.261 for video

ITU T.120 for whiteboard sharing

RTP for transfer of all packets.

+/- Highly interoperable

-) Didn't work through firewall NAT
-) No messaging
-) Directory service

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SIP

Session Initiation Protocol

IETF circa 1996 (RFC 2543)

Very similar to H.323

Text-based messages (like HTTP)

Components:

SIP enabled phones, tablets, PCs

Gateways talk to non-SIP devices

Most new systems are SIP compliant.

Session Description Protocol - handshake

No MTI - H.261 kind of default

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A tale of two systems

▫ Net Meeting / Polycoms

Polycoms video conferencing hardware H.323

Tandberg devices H.323

Most pre-2007 Windows PCs

All could talk to each other

H.323/SIP assumed addressability of all
participants

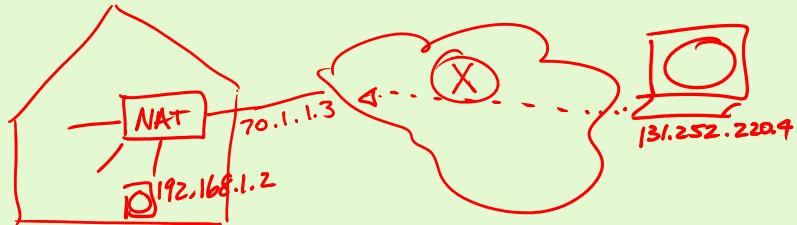
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A tale of two systems

- The Achille's heel of H.323 / SIP = NATs, firewalls,

VPNs

Non-routable hosts were a serious problem



Only solvable w/ knowledgeable person adding rules to NAT / Firewall device

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A tale of two systems

- Skype - provides more integrated solution

Directory service, messaging, filesharing

(when started no screen sharing or multiparty)

~500 Million people

Most important contribution - solved NAT problem

Proprietary system

Only talks w/ other skype clients

VP7 / VP8 technologies for videocon On2

+) widely deployed

-) only skype

anyone could use w/o
network knowledge

security ?

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Skype Architecture

