

Telchemy

Actively Managing Multimedia

Managing and Troubleshooting IP based Telephony

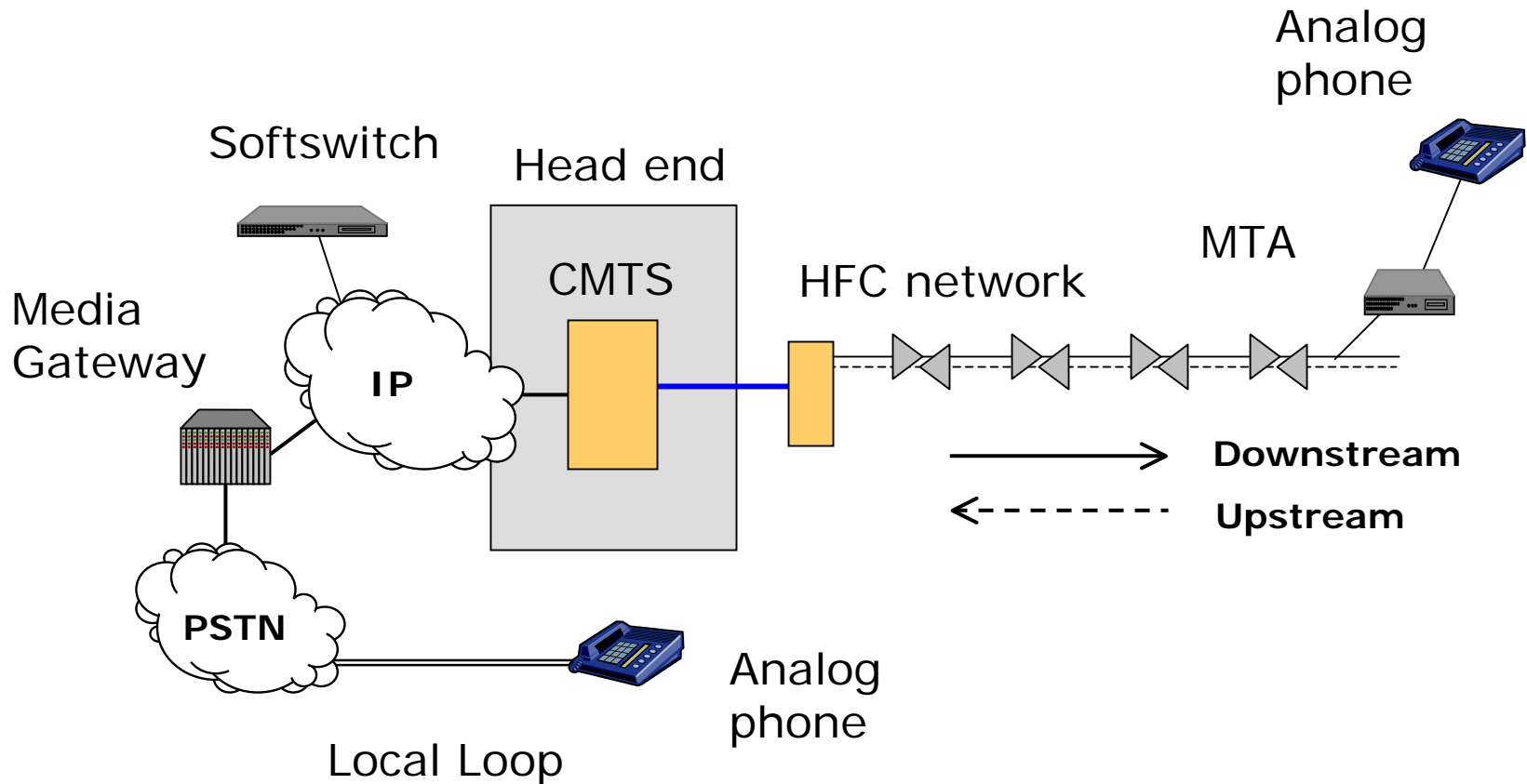
Dr Alan Clark
CEO, Telchemy Incorporated

<http://www.telchemy.com>

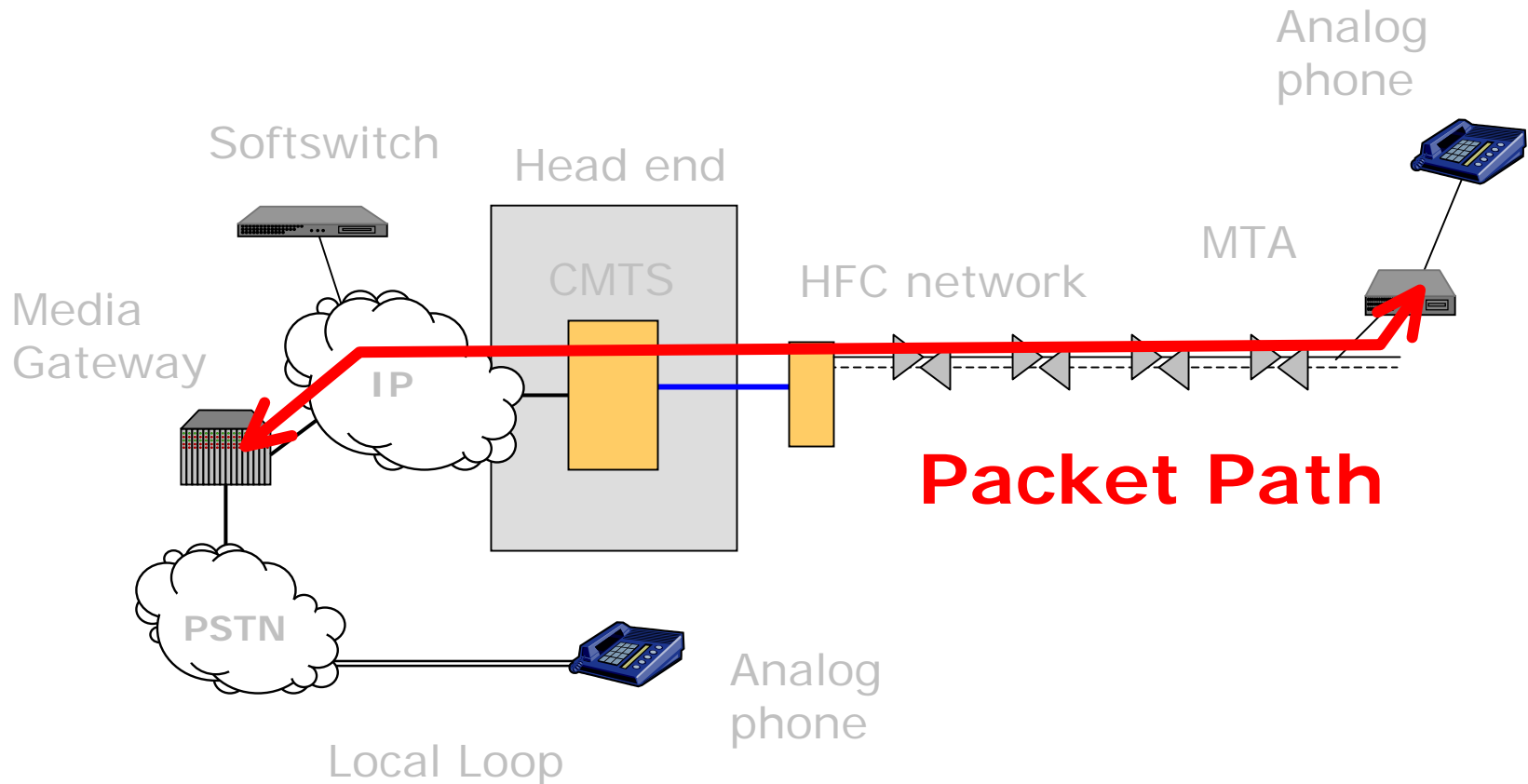
Outline

- Basic network model
- “Packet path” problems
- VoIP over Cable – potential sources of problems
- Service Management
- Active vs Passive Service Monitoring
- Troubleshooting
- Summary

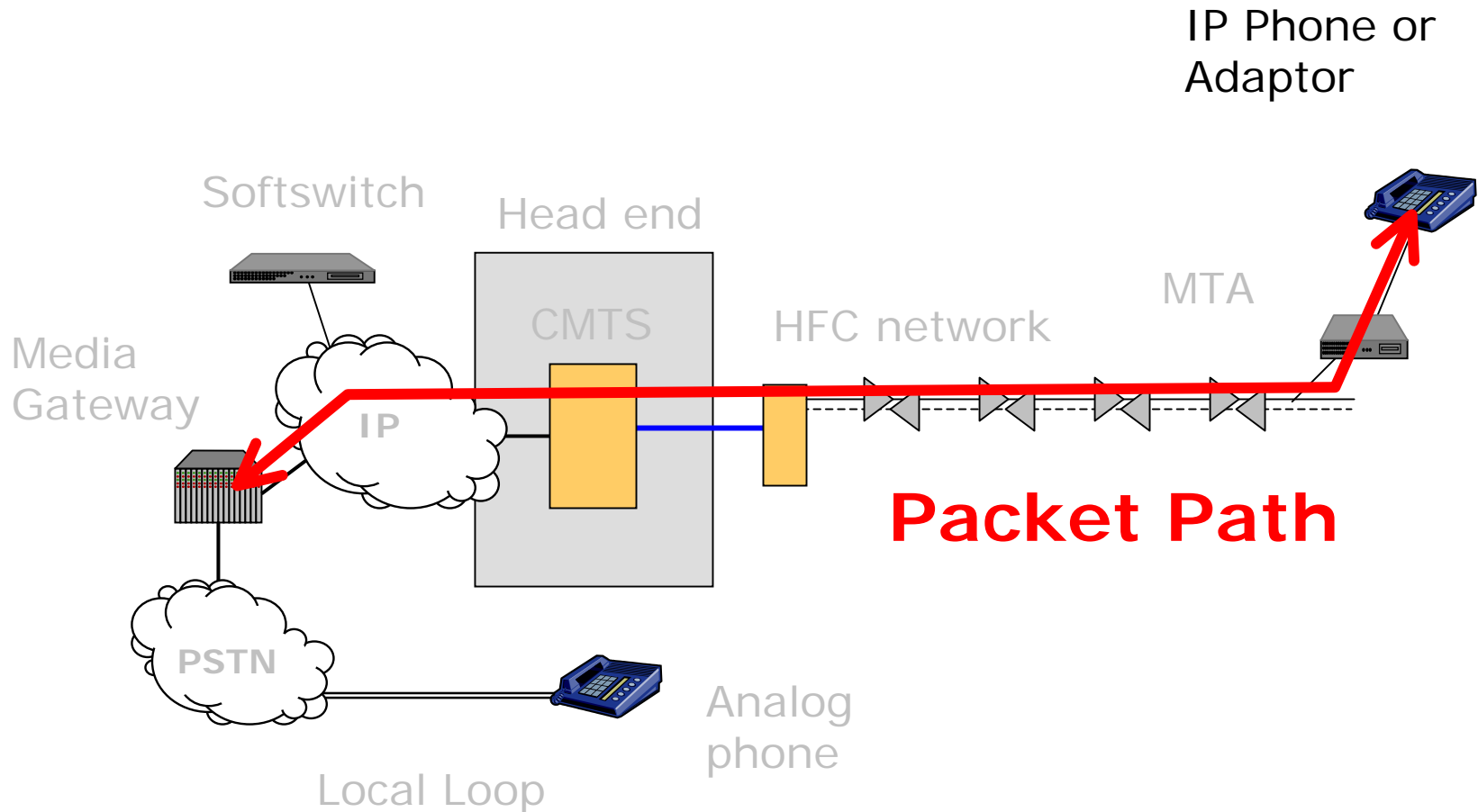
Packet Telephony - Architecture



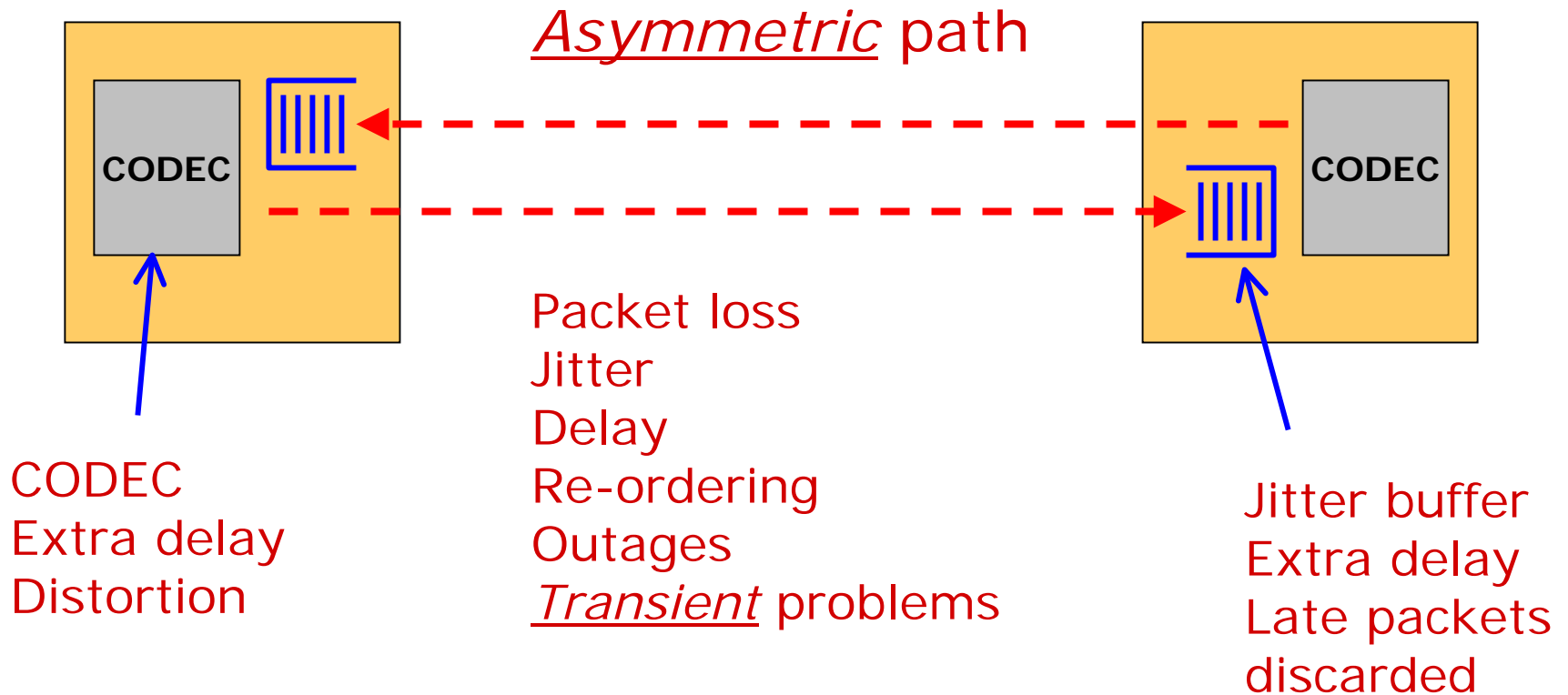
Packet Telephony - Architecture



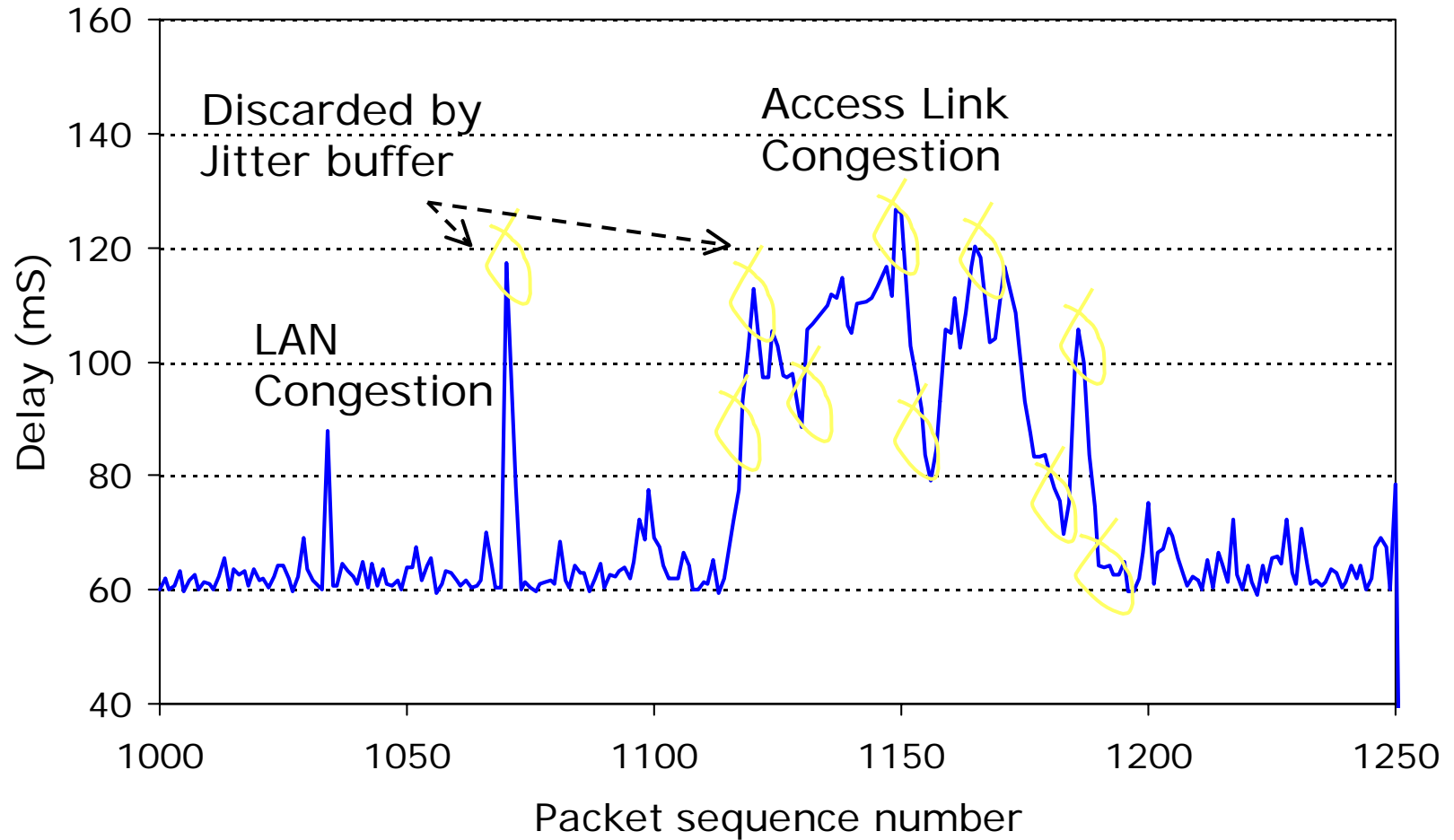
Packet Telephony - Architecture



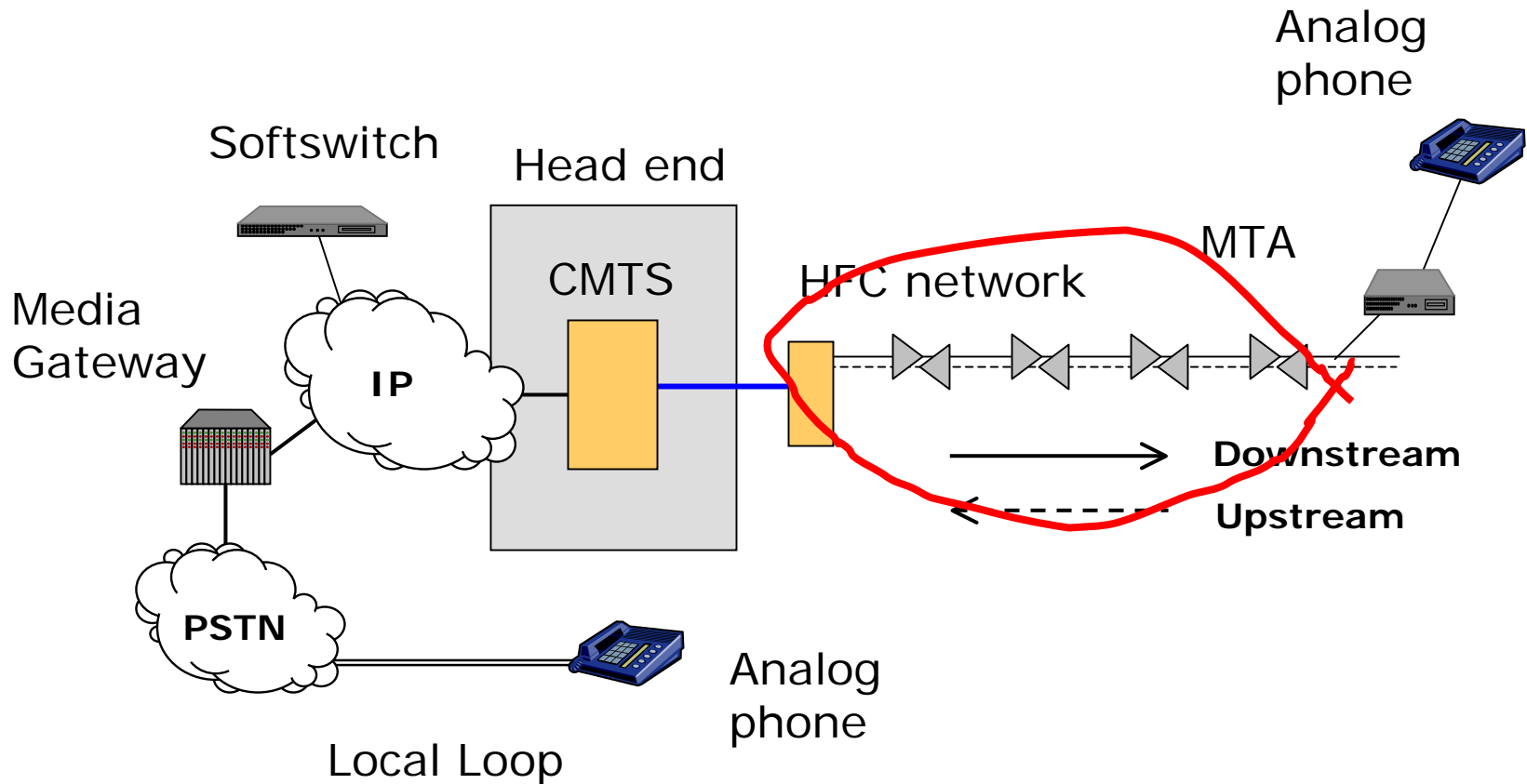
Packet Path



Impairments are transient



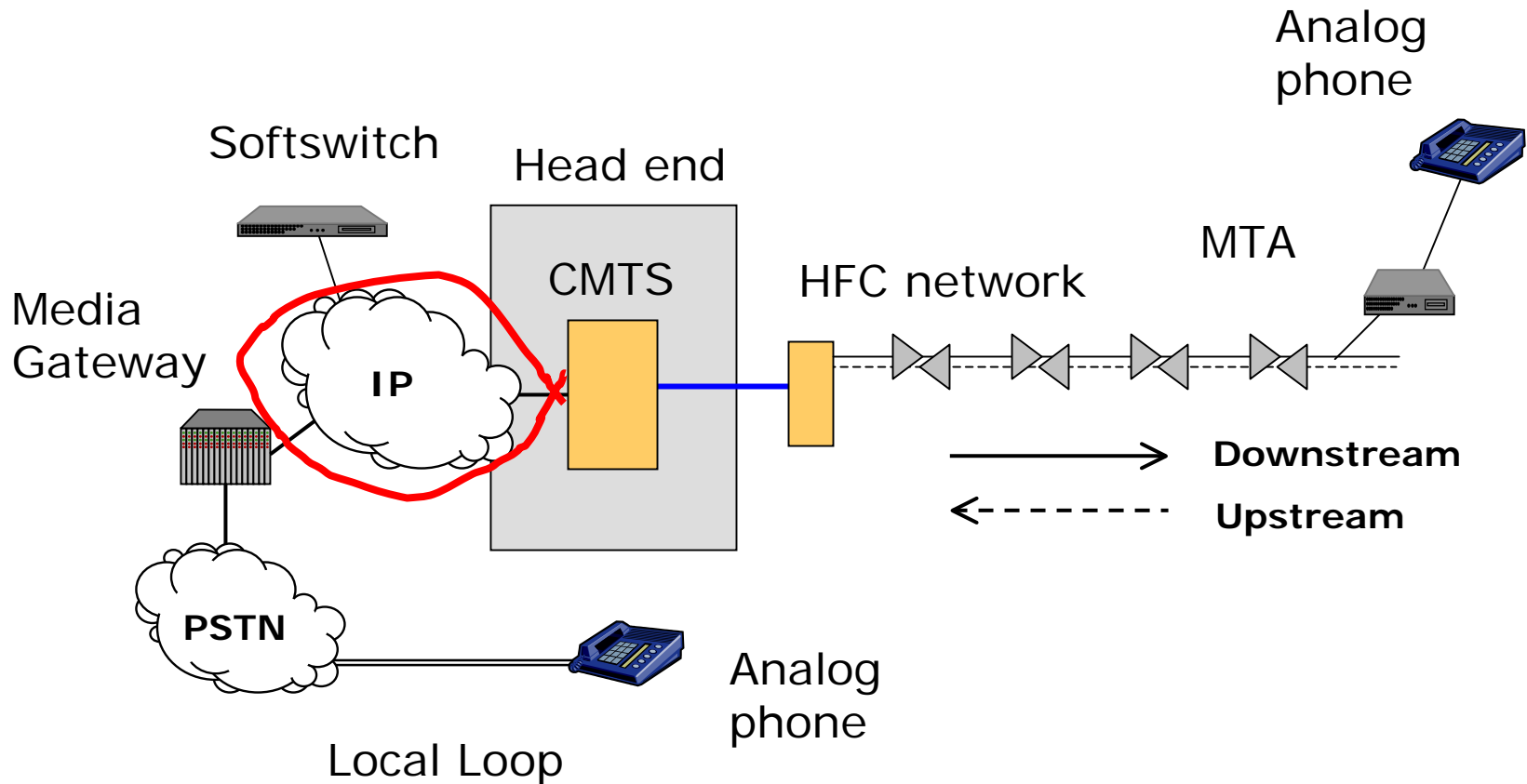
Problems – HFC network



Problems – HFC network

- Packet loss, *delay*, jitter
 - Packet loss - discard errored packets
- Paths are asymmetric
- Downstream path
- Upstream path
 - Ingress noise

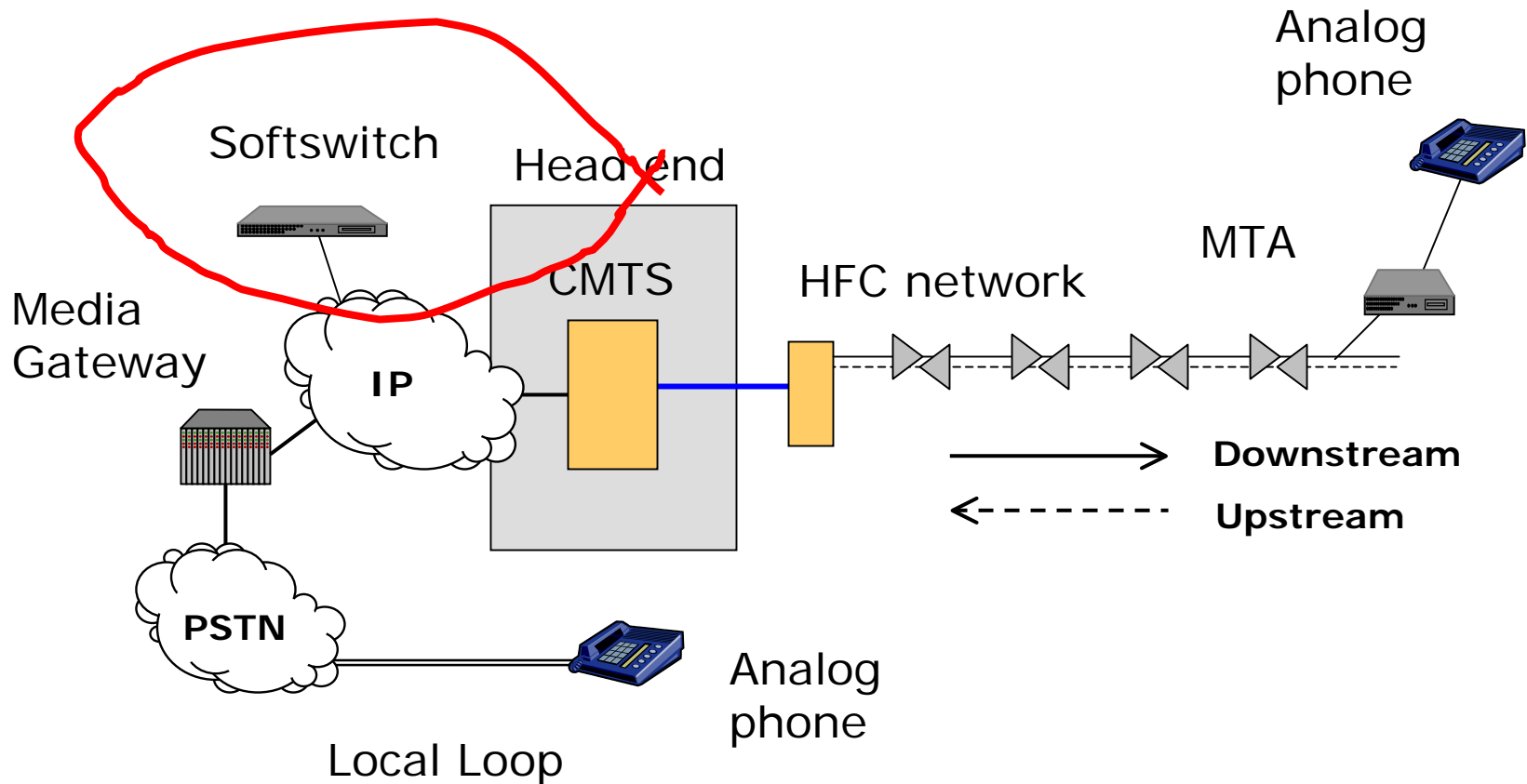
Problems – IP network



Problems – IP network

- Route problem
 - One way voice/ no voice
 - Excessive delay
- Link failures
 - Short break in voice path (one or two way)
- Periodic problems
 - Route flapping
 - Routing table updates
- Transient congestion
 - Transient increase in jitter (and loss)
 - Can be due to DoS attack
- Access link congestion
 - Transient increase in jitter, *COMMON problem*

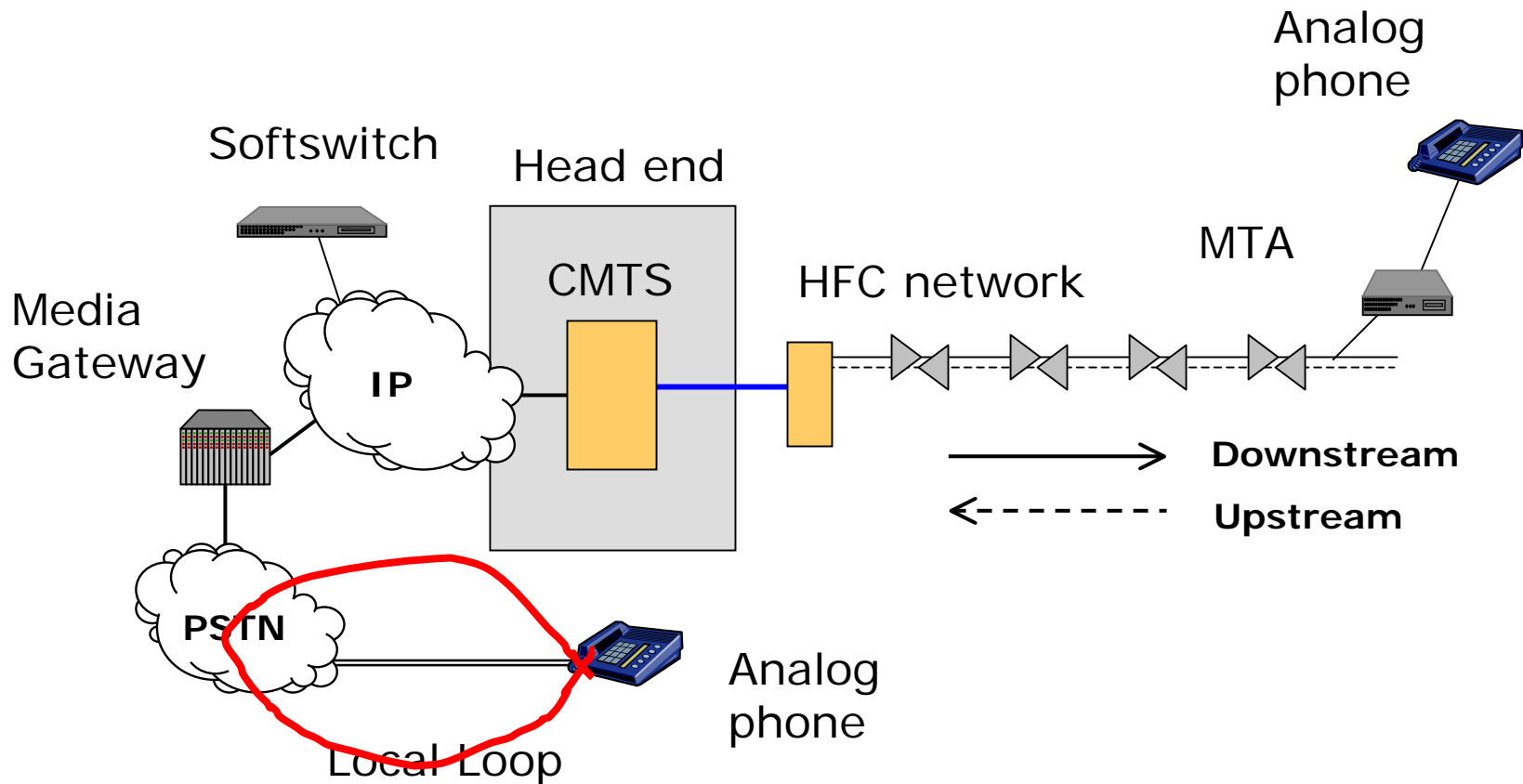
Problems – Call setup



Problems – Call Setup

- Excessive call setup delay
 - Excessive loading on softswitch
 - Packet loss on path taken by signaling
- Configuration problems

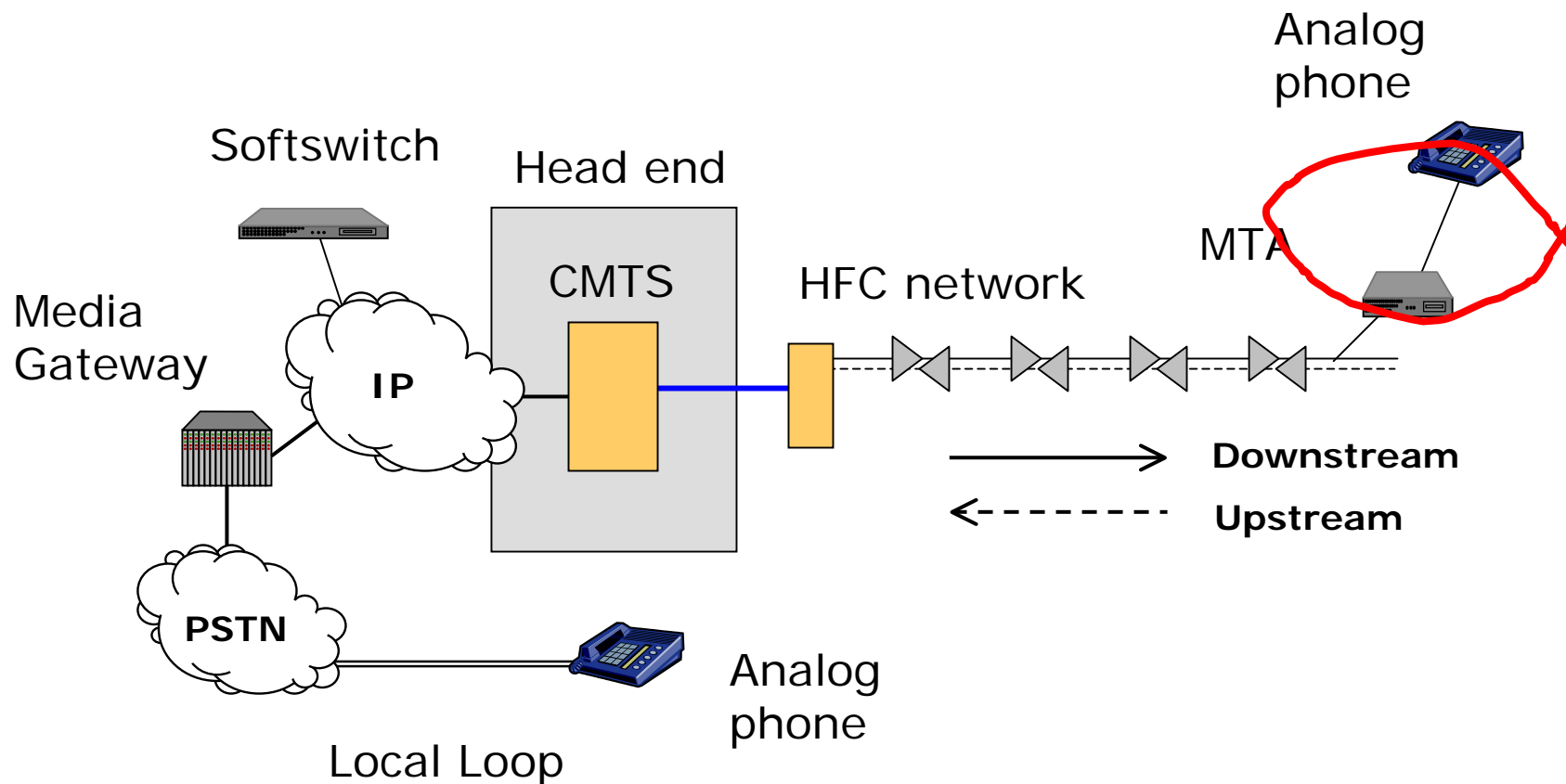
Problems – PSTN Echo



Problems – PSTN Echo

- Echo is quite common on the PSTN but due to low delay, not noticeable
- Additional delay of VoIP systems makes delay more noticeable – need ***echo cancellers***
- But – echo cancellers don't always work
 - Signal level may be too high or too low
 - Non-linearity on echo path
 - Delay may be larger than echo canceller "tail"

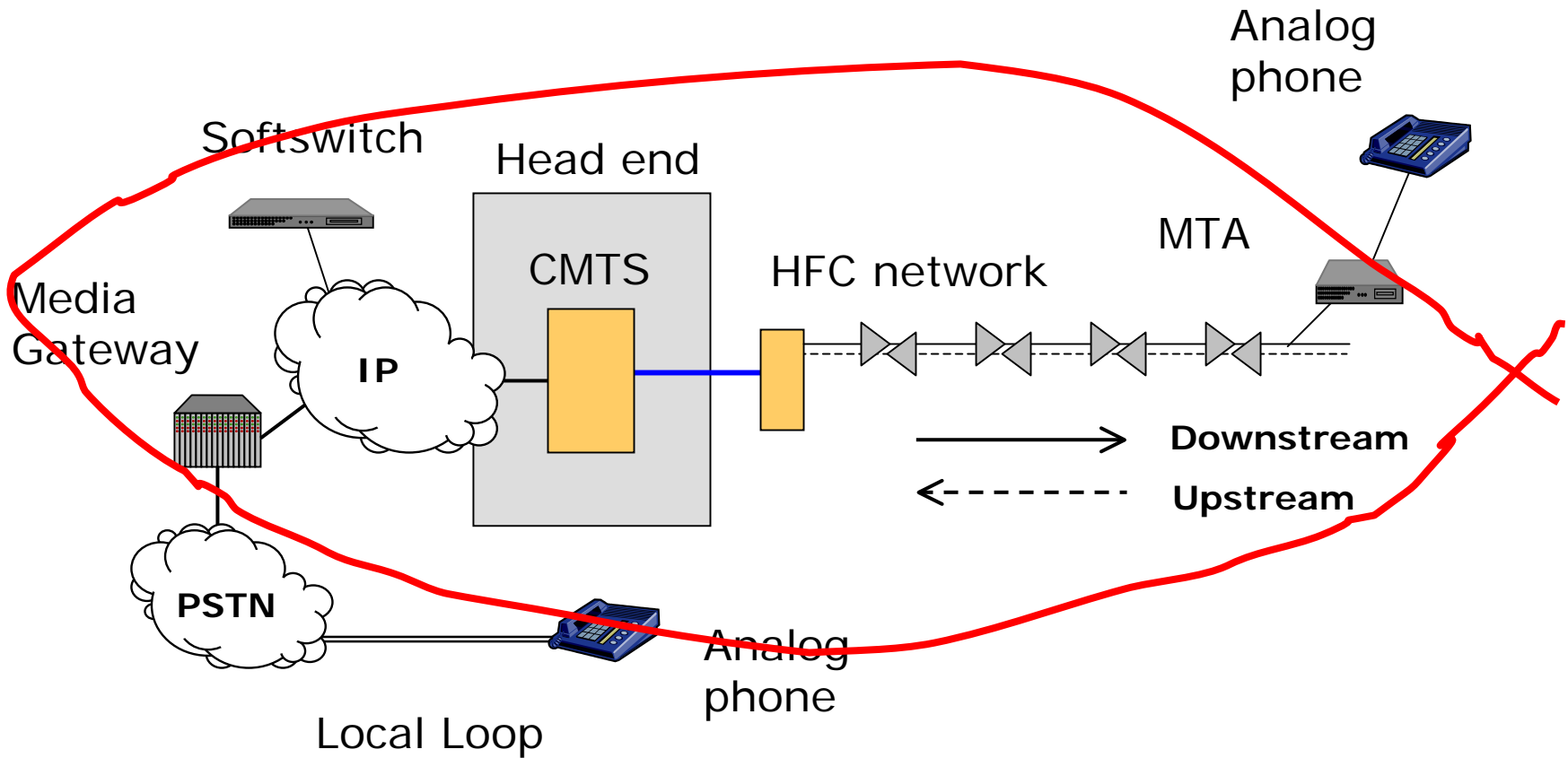
Problems – Customer Prem



Problems – Customer Prem

- Analog phones
 - Conventional problems
 - Loudness, Noise, Crosstalk, RENs.....
- IP phones or Analog Adaptors
 - VoIP packets may be treated as data packets, leading to excessive jitter levels
 - MTU size/ prioritization/.....

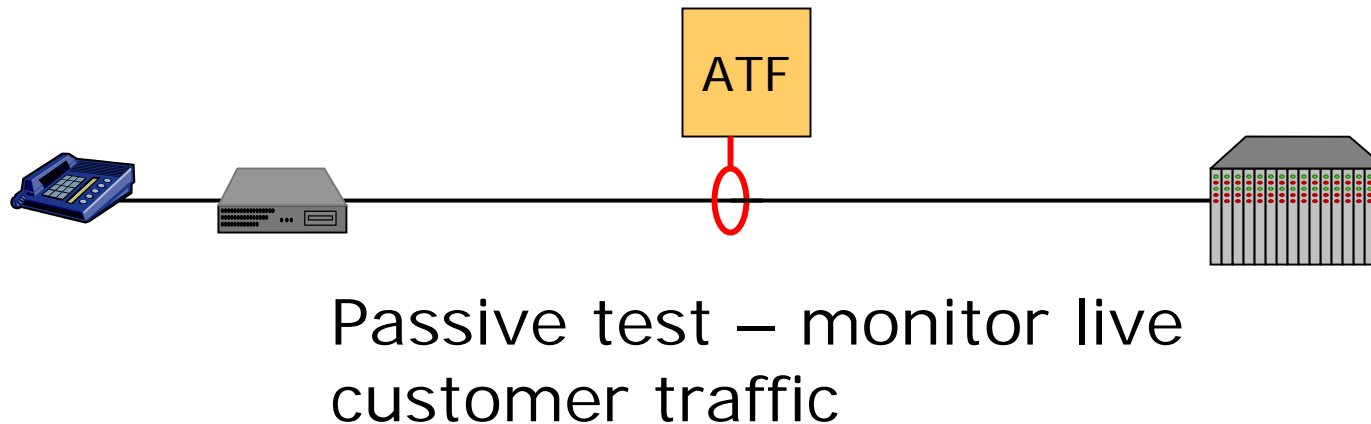
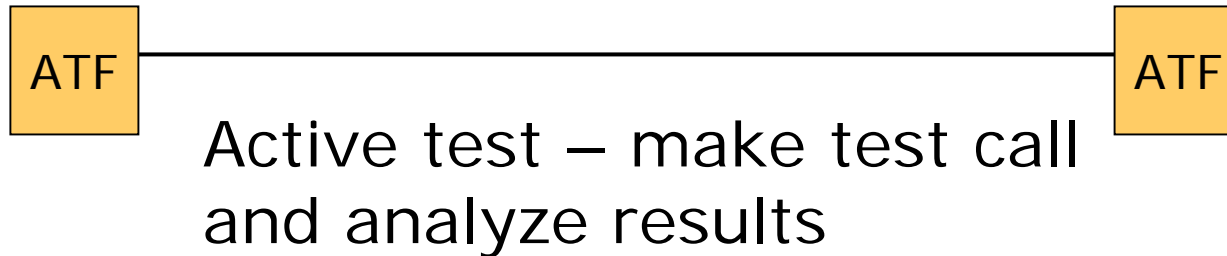
Problems – Loss Plan



Problems – Loss Plan

- Loss Plan defines the signal level at key points in the network
- If signal levels are too high
 - Clipping and distortion
 - Calls may be too “loud”
- If signal levels are too low
 - Calls may be noisy
 - Calls may be too quiet
 - Misoperation of echo suppression and VAD algorithms can lead to gaps in speech

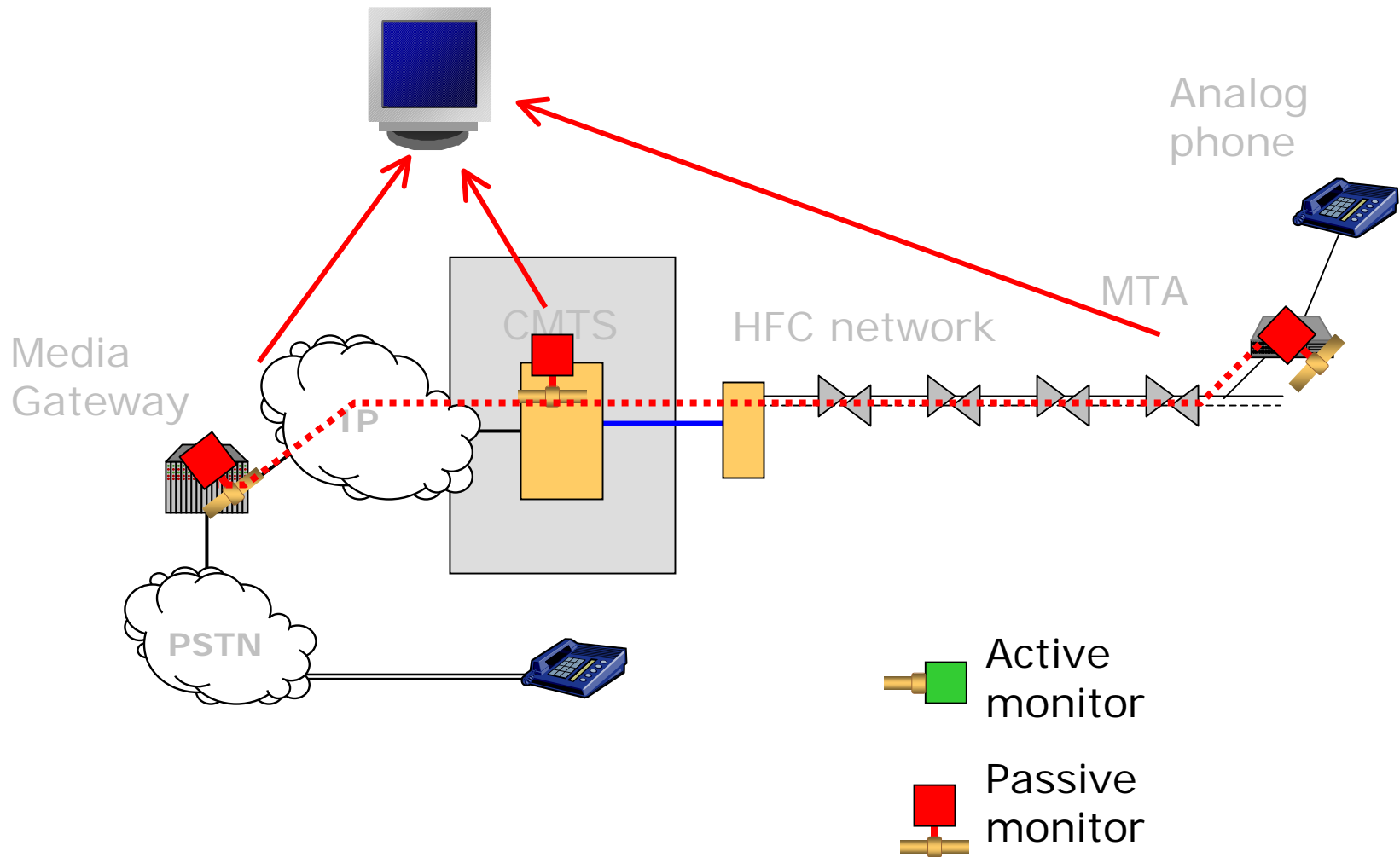
Active vs Passive testing



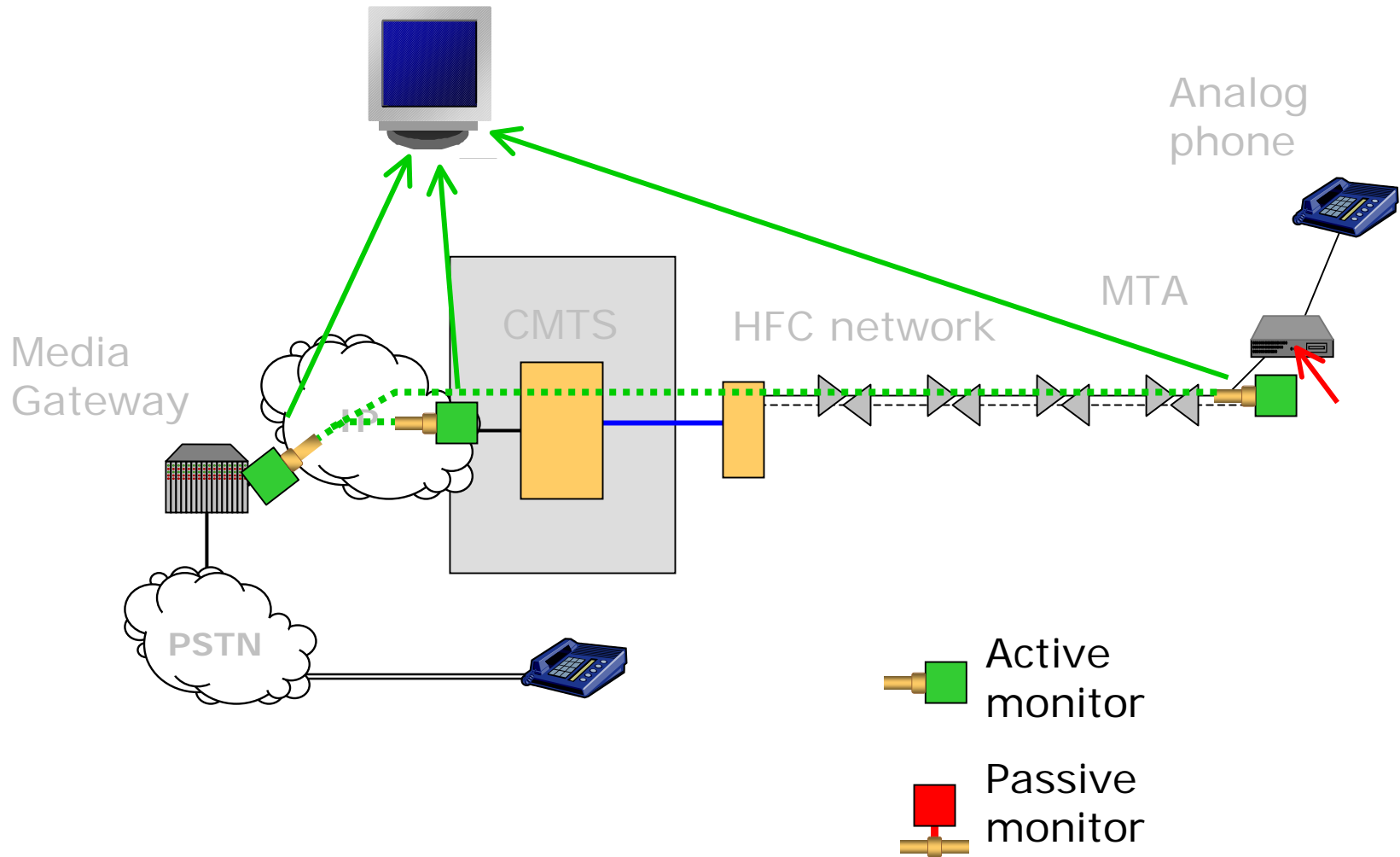
Active vs Passive testing

- Active test
 - Can be done at any time, scheduled or on-demand
 - Sees the path between active test functions
 - Can detect problems before customers are affected
 - Ideal for pre-deployment, service assurance and troubleshooting
- Passive test
 - Can only be done when there are live calls
 - Sees the path from the source VoIP device to the monitoring point
 - Measures what actually happened to customer call
 - Ideal for service management, post-call problem diagnosis

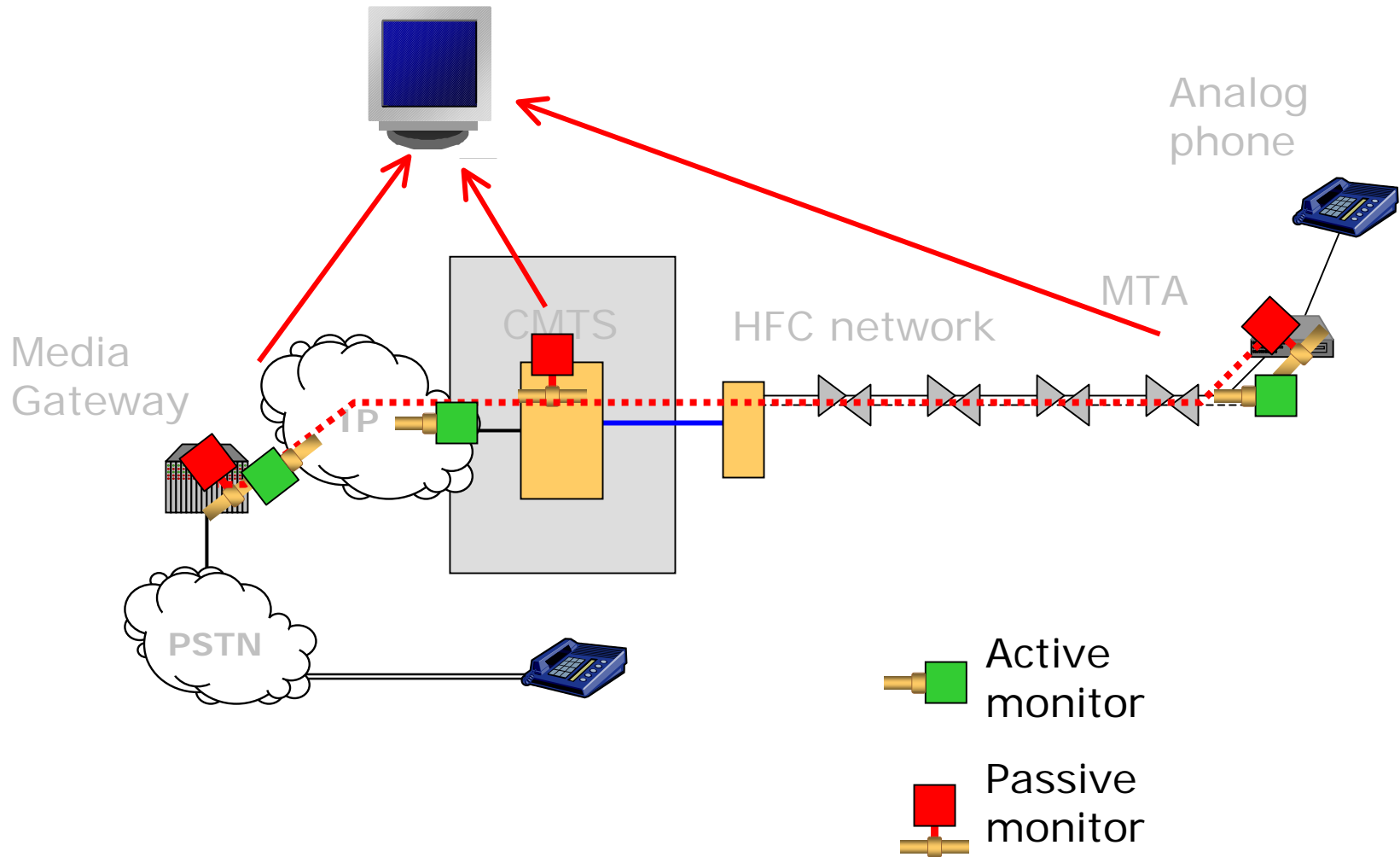
Deploying passive monitoring



Deploying active monitoring



Management infrastructure



Outline

- Basic network model
- “Packet path” problems
- VoIP over Cable – potential sources of problems
- Service Management
- Active vs Passive Service Monitoring
- Troubleshooting
- Summary

Check out – www.voiptroubleshooter.com