Ensuring Subscriber Quality of Experience for Triple Play Services

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Ensuring quality and reliability – cost effectively

- New VoIP and IPTV services are highly susceptible to problems
- Problems can occur
  - anywhere along the transmission path (including customer premise LAN)
  - at any time, and may not be reproducible
  - due to faults, congestion, media stream configuration
- Solutions?
  1. Overprovision, exert tight access control, own the entire end-to-end path, manage the customer LAN
  2. Continuous monitoring of end-to-end path, software agents for remote problem diagnosis

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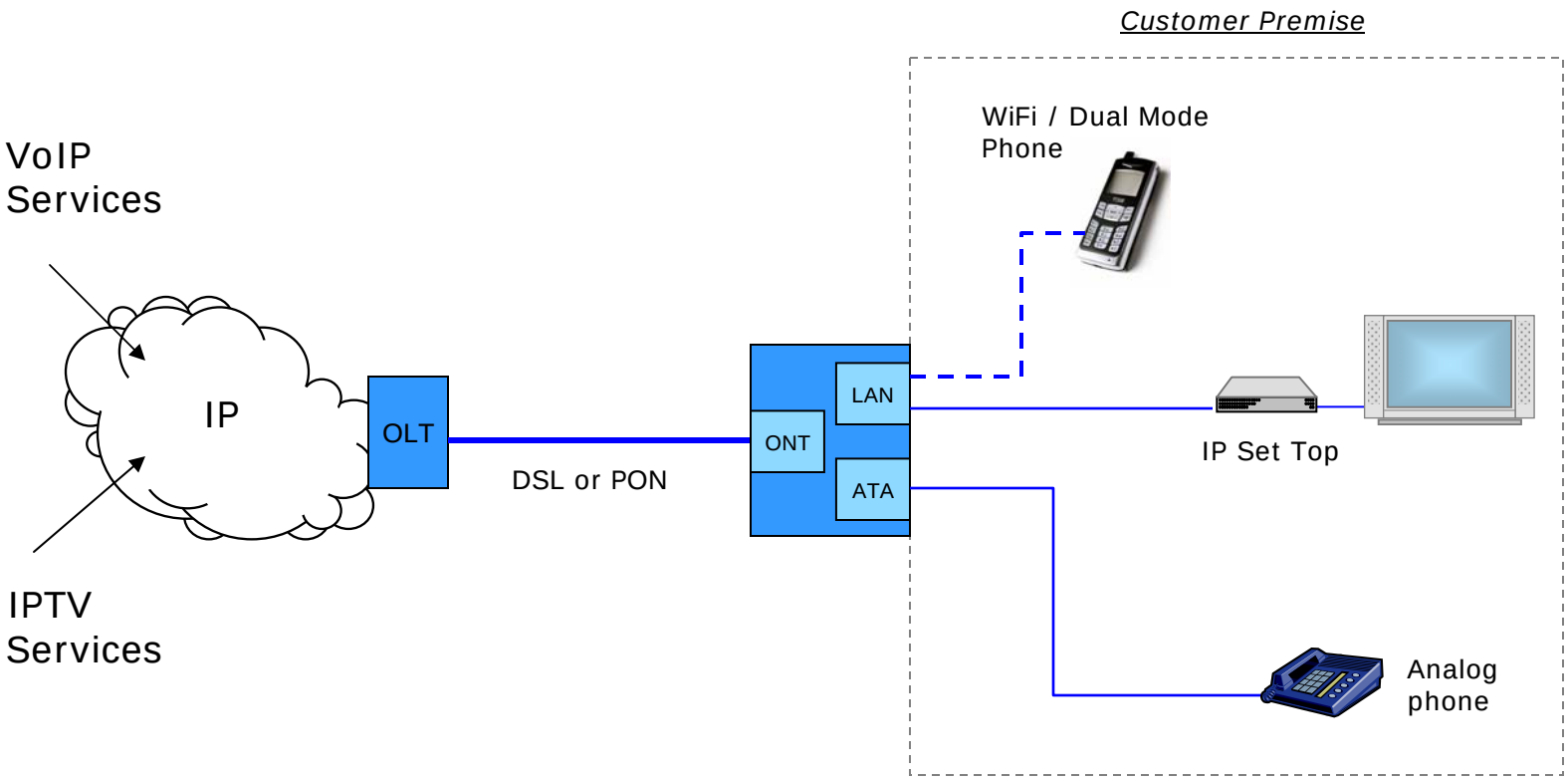
Triple Play scenario



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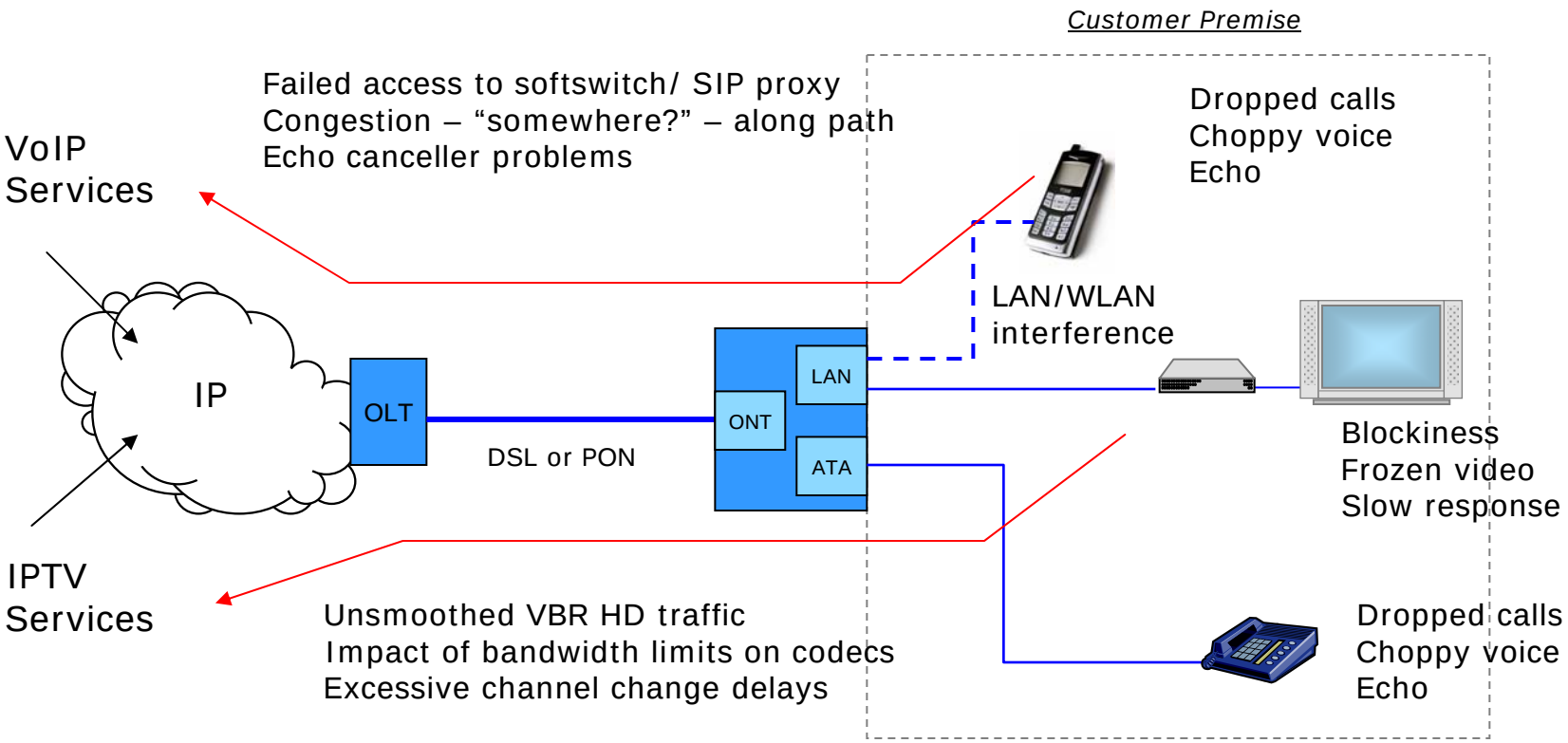

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Distributed passive monitoring

- Integrate passive VoIP/IPTV performance monitoring agents directly into network equipment and CPE
- Capture information on transient problems
  - Understand impact of transients on Subscriber QoE
  - Supports post-analysis for individual subscriber troubleshooting AND analysis of system-wide problems
- Express results in terms of QoE metrics (i.e. MOS) with supporting diagnostic data

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Distributed active testing

- Active testing helps with troubleshooting, SLA monitoring, pre-deployment test
- Active test agents can create simulated VoIP/ IPTV sessions, specialized diagnostic tests, periodic tests….
- Active agents can be made small enough to fit into CPE
- Tests can be run internally within customer LAN (e.g. poorly performing WLAN)
- Tests can be run from customer premise to servers/ resources within service provider network (e.g. SIP proxy)

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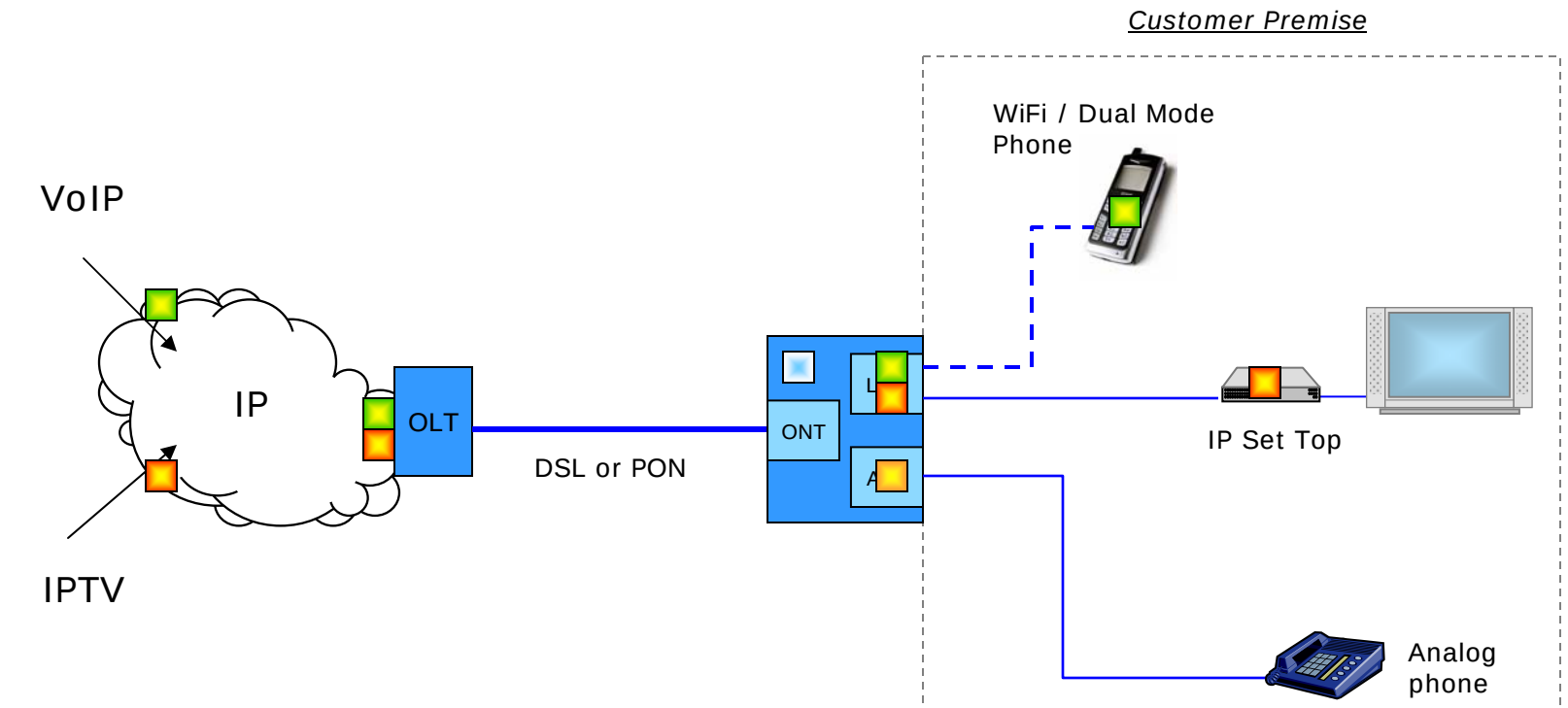
Distributed performance monitoring



- Active test – VoIP/IPTV (1 MIP/ 1Mbyte)
- Passive monitor – VoIP (0.01 MIPS/ 50Kbytes)
- Passive monitor – IPTV (1 MIP/ 100Kbytes)

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What can embedded agents incorporate?

- VoIP
  - IP – lost/ discarded packets, burstiness of loss/discard
  - IP network and CPE related delays
  - Payload – signal, noise, echo levels
  - Equipment characteristics (codec, PLC…)
  - Estimation of Listening/ Conversational MOS

- IPTV
  - Impact of lost packets on video frames
  - Error propagation through GoP
  - Video bandwidth, codec type, quantization levels
  - Video content – level of detail, motion
  - Video source problems – frozen, blank, noisy video
  - Estimates of Video and Audio MOS

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Summary

- Distributed/ embedded performance monitoring – extending to the customer premise
- Continuous passive monitoring - supports real time detection of quality problems, post-analysis of calls/ sessions with transient problems, analysis of large scale problems
- Embedded active test agents – support remote problem diagnosis within customer LAN or service provider network
- Currently – extending agent technology to support automatic/ distributed problem diagnosis and location
- Migration towards self-managing/ autonomic network

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