Troubleshooting QoS Problems

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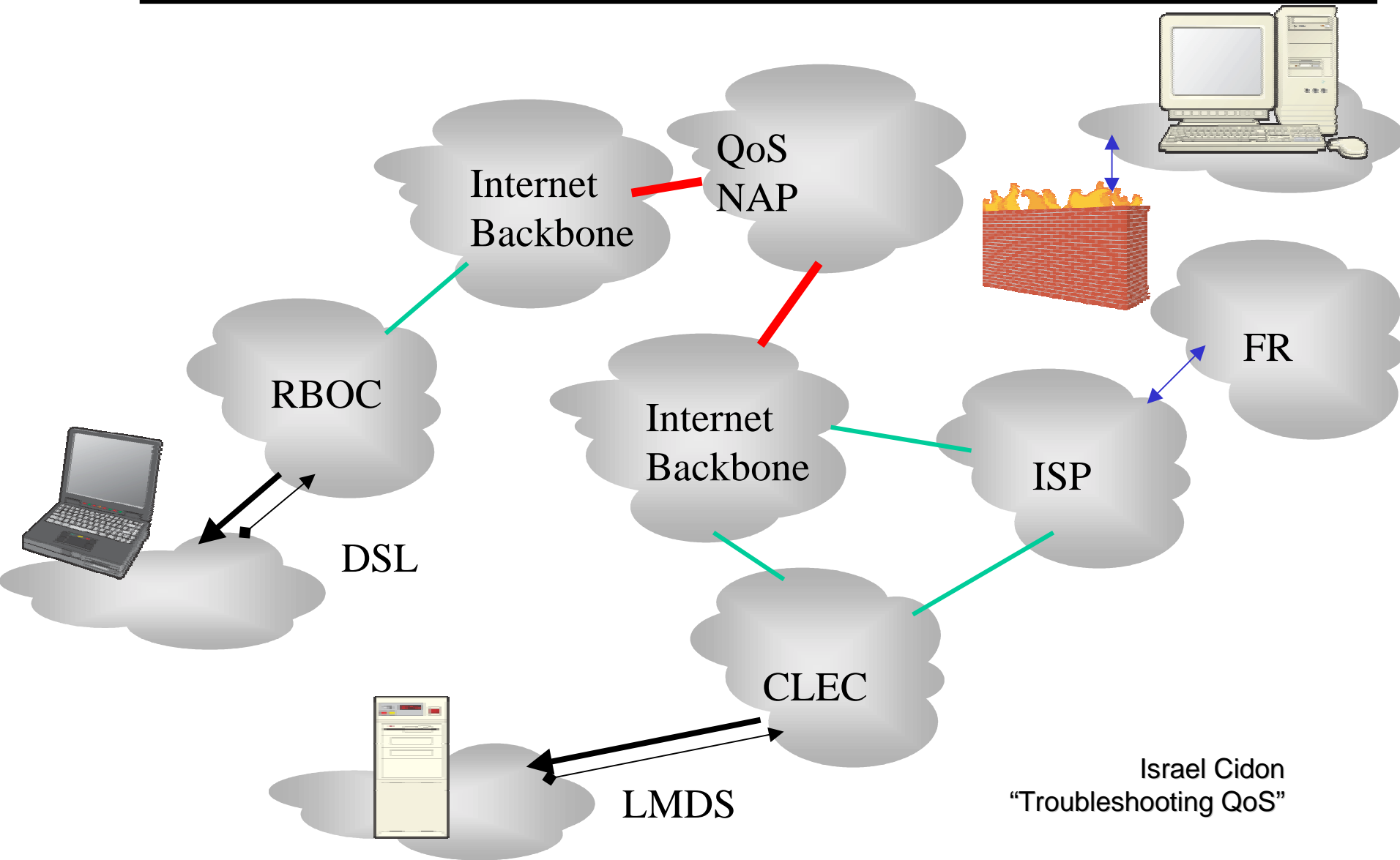
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QoS Challenges

● **Hard to Pinpoint Source of QoS Problems**

- Complex end-to-end structure
    - Emerging specs, networks, and technologies
    - Multiple network and service providers
    - No QoS routing

- "Need for Speed" in launching services and QoS provisioning

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QoS Nightmare?

Internet Backbone

QoS NAP

RBOC

Internet Backbone

FR

ISP

DSL

CLEC

LMDS

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QoS Fault Isolation Barriers

- Anywhere-anytime => massive deployment

- Evolving environment => frequent changes

- System vs. element test => centrally controlled, coordination, correlation of multiple tests

- Cross organizations => security barriers, finger pointing

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QoS Fault Isolation – Network Problem Isolation

- ● Top down analysis
  - • Problem verification
  - • Service vs. network
  - • Vendor and network isolation
  - • Subnet and route isolation
  - • Network layer faults identification

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QoS Fault Isolation – Network Problem Isolation

- **End-to-End specification**
  - loss, delay, jitter, out of order, fragmentation
  - Statistical behavior
  - Impact and correlation analysis among services

- **End-to-end limitations**
  - Location & problem classification

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QoS Fault Isolation – Problem Verification

- Systematic user perspective
  - Active vs. Passive
  - Deployment Issues

- Correlation of performance and service usage
  - Is problem real?

- Repeating faults scenario

- Resolving network/service finger pointing

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QoS Fault Isolation – Testing Mechanisms

- Controlled traffic emulation
- Service response time measurements
  - active & passive methodologies
- Application routing discovery
  - trace route, topology
- Network internal key-point measurements
- Remote/Distributed/Coordinated testing

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QoS Fault Isolation – Products

- Distributed Network Testing

- Protocol Analyzers

- Application Response Verifiers

- Traffic Generators

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"End through End" Fault Isolation

*Measure
end-to-end*

Sender

Receiver

*Track emulated traffic
Correlate cross-traffic*

**Deployed or
embedded analyzers**

**Map, operate,
collect, correlate,
analyze**

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