

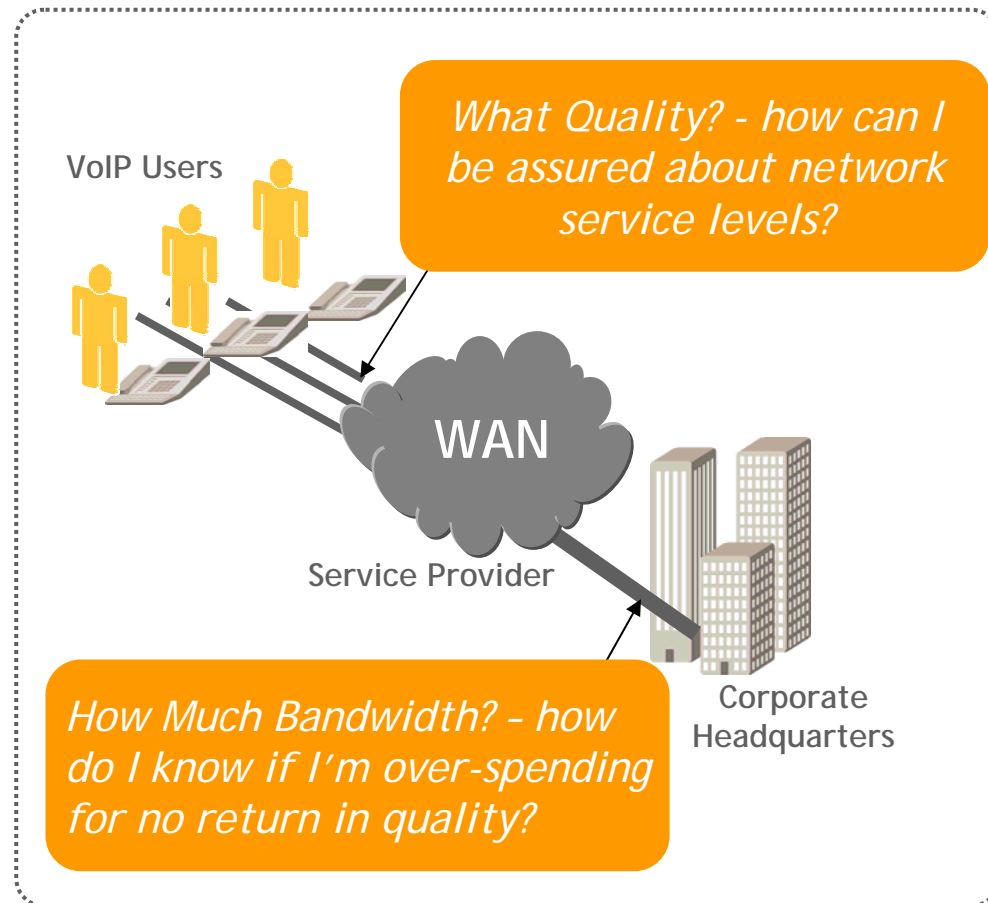
# Measuring VoIP Performance

Donal Byrne, CEO, Corvil

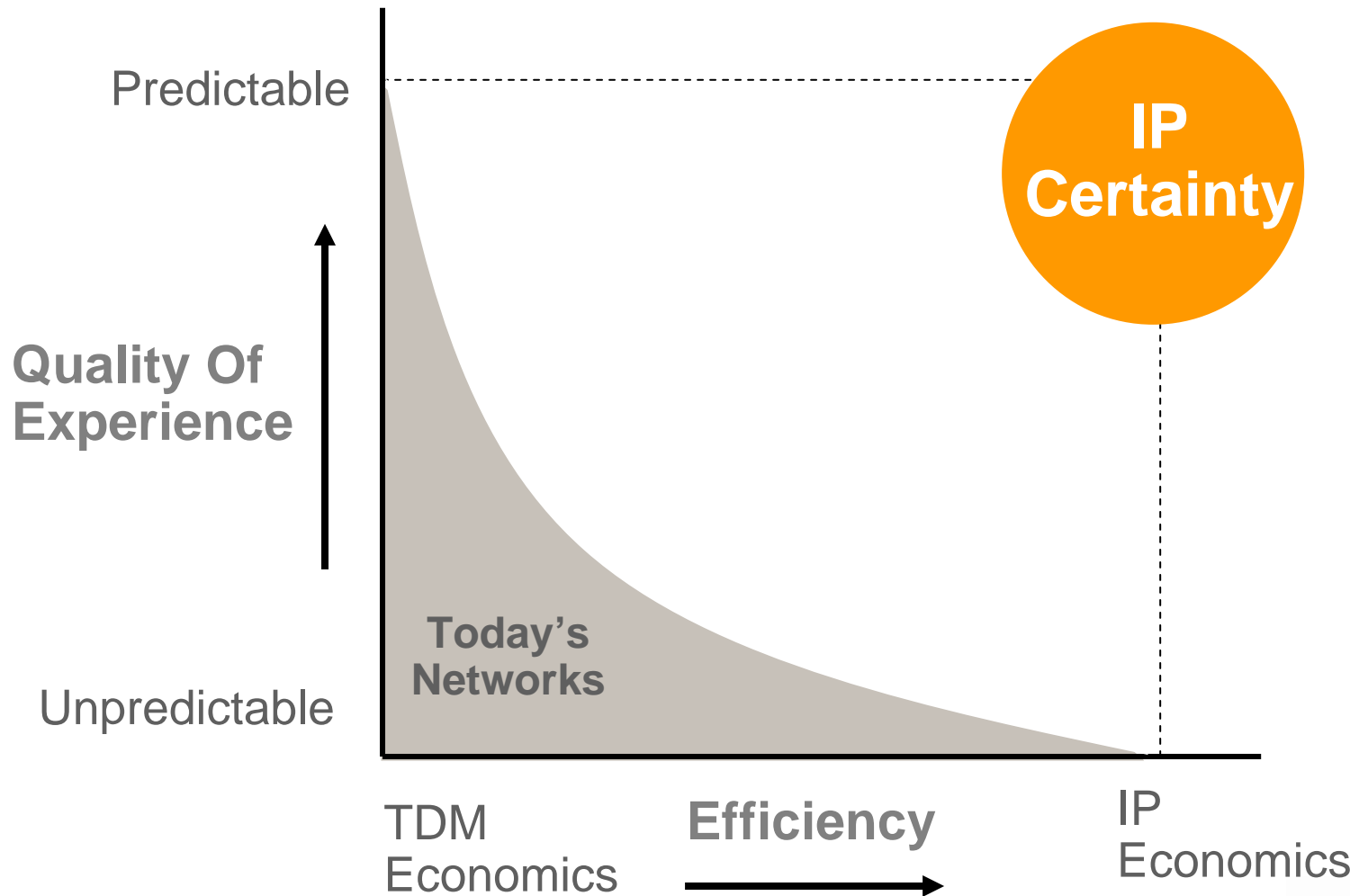
N+I Las Vegas, May 5, 2005

# What's The Business Imperative?

- VoIP rollouts promise a rich user experience with substantial OpEx savings
- But can the network deliver the right service levels for voice traffic? And how will the voice traffic impact my other traffic?
  - *QoS issues will result in poor performance, reduced reliability, disgruntled users and, ultimately deployment failure*
- Over-provisioning bandwidth to protect QoS is not a safe option, and can be cost prohibitive
- You need a deterministic way to control both network quality and network costs for VoIP...
  - BEFORE committing to rollout



# The IP Certainty Challenge



# What is Needed for IP Certainty



An Intelligent Instrumentation Layer that quantitatively describes the relationship between:

- The Bandwidth
- The Traffic
- The Quality Of Service

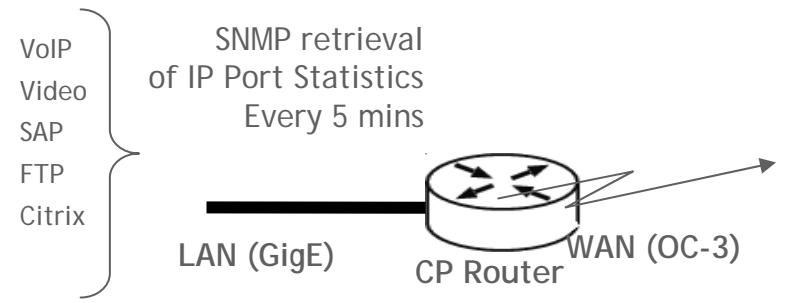
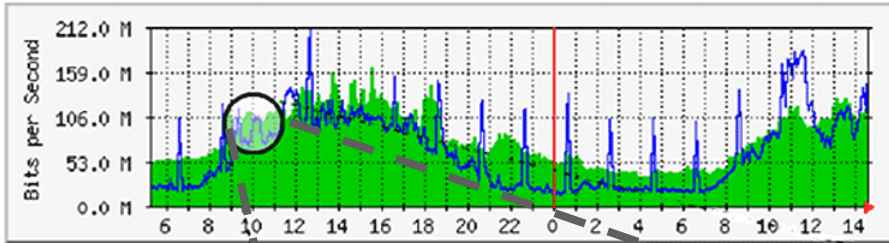
*“It is not possible to manage what you cannot control, and you cannot control what you cannot measure”*

*Peter Drucker  
Management Guru*

# Source of IP Uncertainty

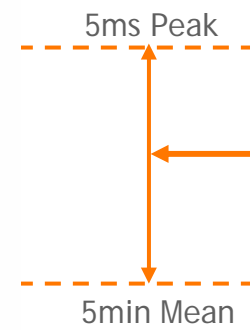
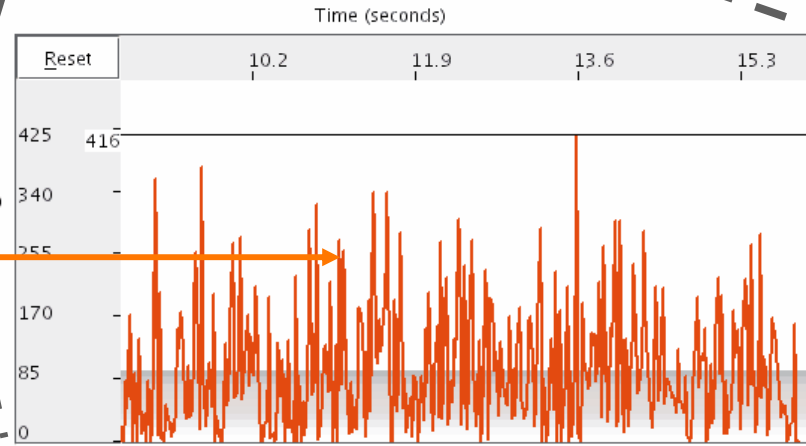


## Current Network Instrumentation



## Current Reality

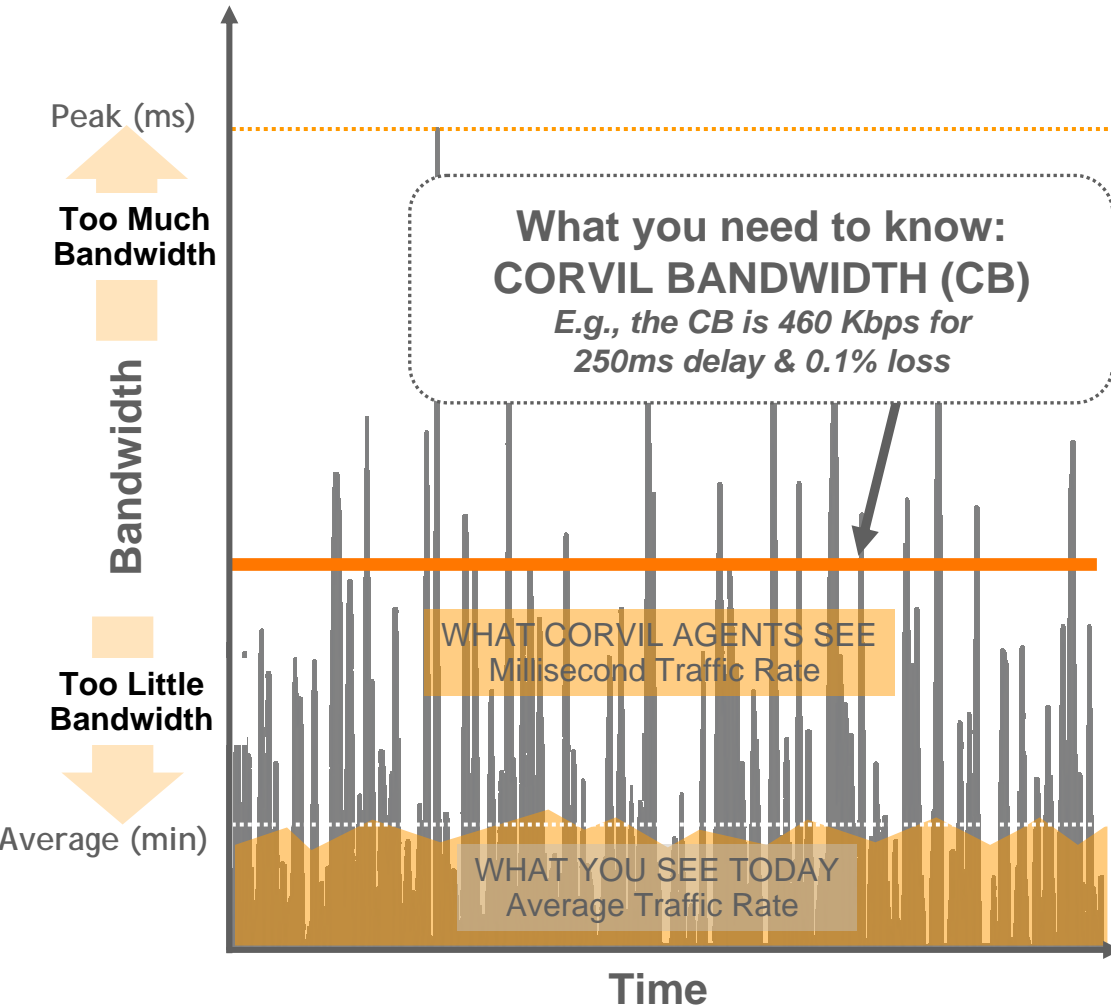
5 millisecond sampled view of Traffic - a short timescale measurement not available from today's routers



Bandwidth Requirement lies UNKNOWN in this zone

*IP Networks are NOT instrumented to provide the necessary knowledge*

# Breakthrough - Corvil Bandwidth



- **UNIQUE CAPABILITY** embedded intelligent agents compute bandwidth required as a function of QoS

# Setting QoS Thresholds to meet Service Level Objectives



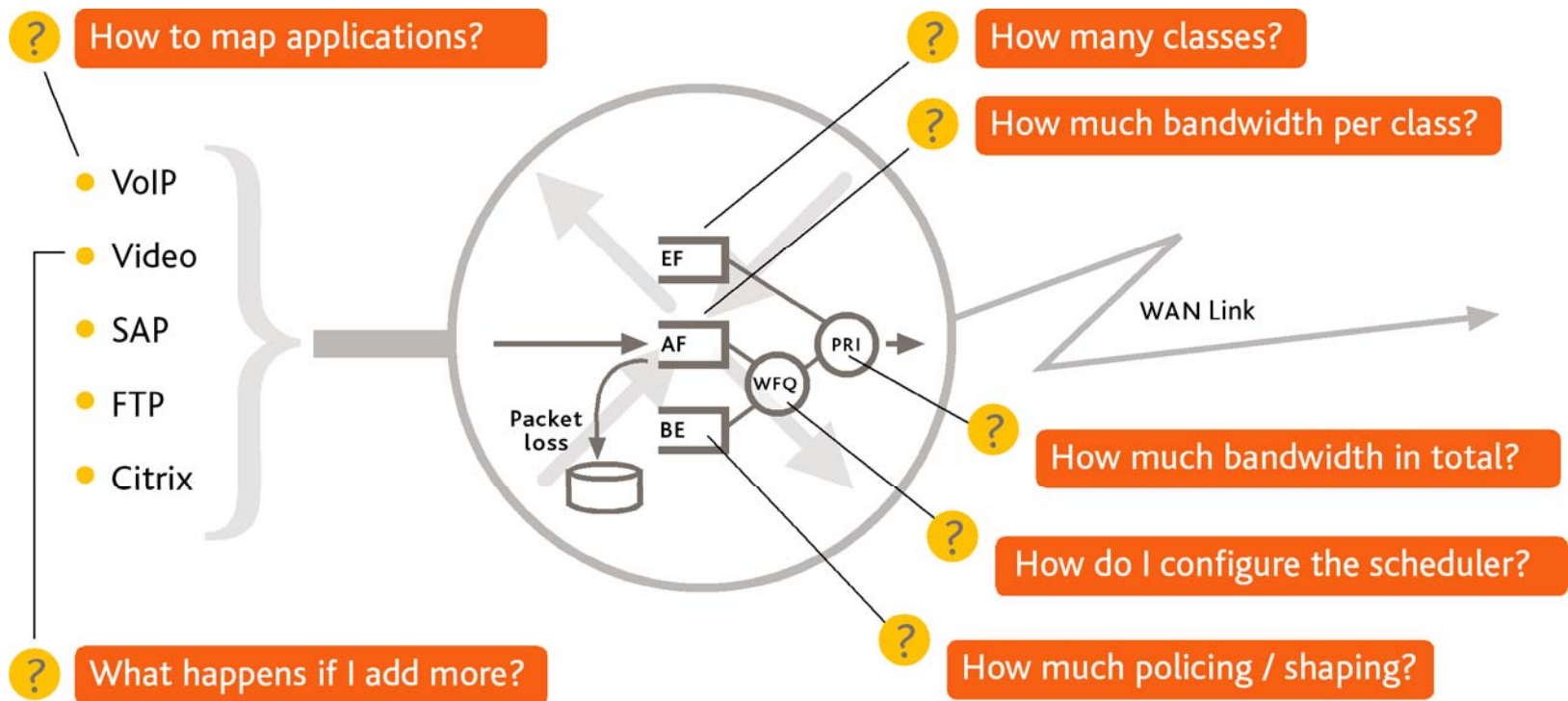
Class	End-to-End Delay (Jitter)	End-to-end Loss	Per-hop Delay	Per-hop Loss
Voice	<150ms (20-40ms)	0.1%	10-40ms	.05-.1%
Interactive Video	150ms (30ms)	1%	15-30ms	.5-1%
Transactional	Application Dependent. Typically < 1000ms	0.1%	100-500ms	.05-.1%
Interactive	Application Dependent, 150ms (50ms)	0.1%	25-50ms	.05-.1%

- Different Applications can tolerate different levels of packet loss and delay, which are expressed as statistical limits
  - *e.g. VoIP => .1% packet loss and 40ms delay for 99.9% of packets*
- These are referred to as Service Level Objectives (SLO)
- SLOs may or may not form the basis of a legal contract, but if they are not met the application will not operate correctly
- Current technologies do not help the network manager to design & implement QoS to meet SLOs

# Implementing QoS



- Corvil Bandwidth is captured from the instrumented network to provide actionable output on fundamental questions

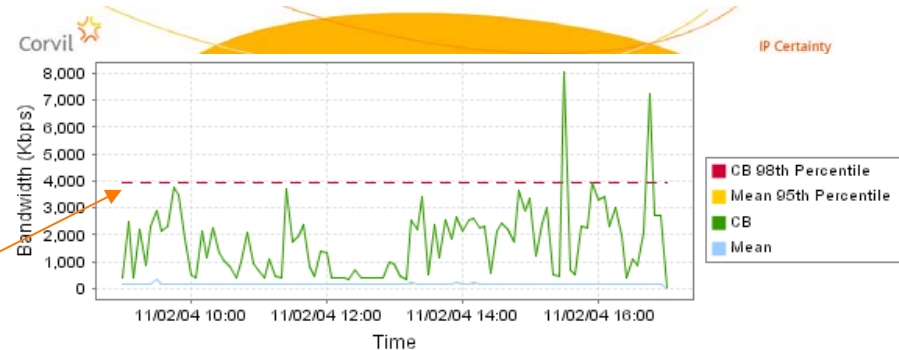


# Case Study: Enterprise VoIP Rollout

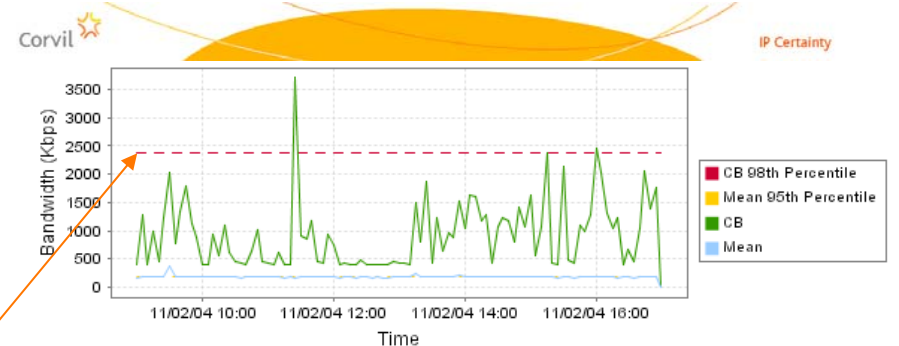


- Corvil “what-if” capability was used to determine the impact of VoIP on the existing network prior to deployment
- 5 simultaneous VoIP calls with Silence Suppression were added to current traffic with a delay target of 40ms
- The network manager quickly established the *Corvil Bandwidth* as 3.9Mbps
- Next he ran a “what-if” scenario on Corvil to determine the bandwidth saving from turning on QoS in the router
- He quickly discovered that by placing Voice in the priority queue and all other traffic in the best-effort queue, the overall bandwidth requirement could be reduced to 2.37Mbps

Corvil “What-If” After Adding VoIP (No QoS on Router)



Corvil “What-If” After Putting Voice Traffic in Priority Queue



# Who is Corvil?



- Software company based in Dublin, Ireland with sales offices in New York & London
- Founded in 2000, now at 75 employees
- Patents based on core mathematics expertise - *key insight: "measure directly the entropy of packet traffic"*
- Cisco Systems is an investor & partner
- World Economic Forum 'Technology Pioneer 2004' - *"technology with the potential to have a substantial long-term impact on business and society in the future"*
- For more information visit [www.corvil.com](http://www.corvil.com)





IP Certainty