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# Testing the Whole Network.

The key to Understanding  
Application Performance

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# Agenda

- Performance Testing
- Application and Infrastructure
- Technologies, Speeds, Feeds, Control & Data Plane
- Test Issues in New Technologies
- Technical Considerations
- What you should demand and expect from your suppliers
- Test Plans and Expertise

# Spirent Communications

A leading provider of performance analysis and service assurance systems focused on accelerating the development, deployment **and management** of next generation network equipment and services worldwide

## Forums

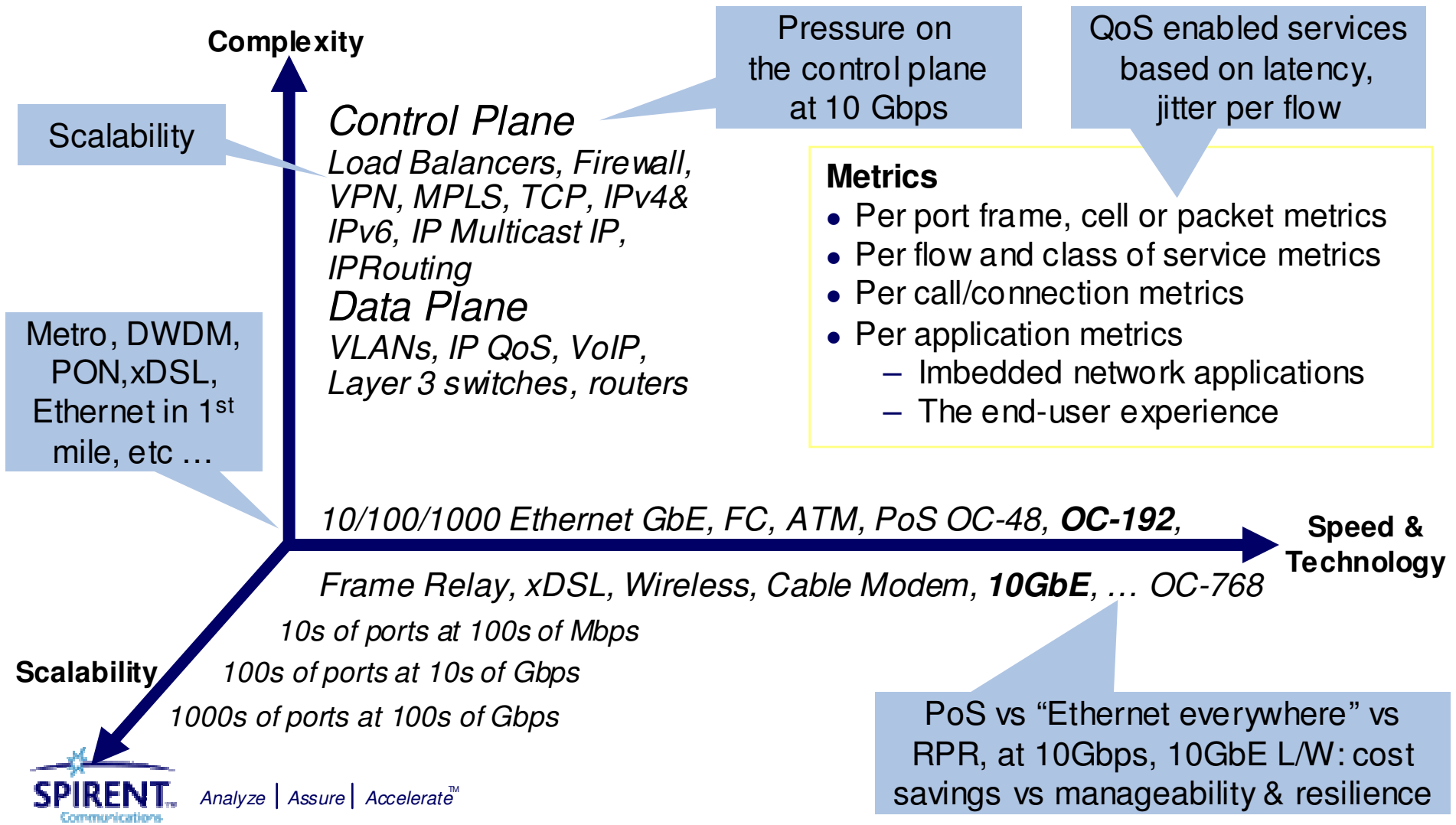


## Advanced Test Programs



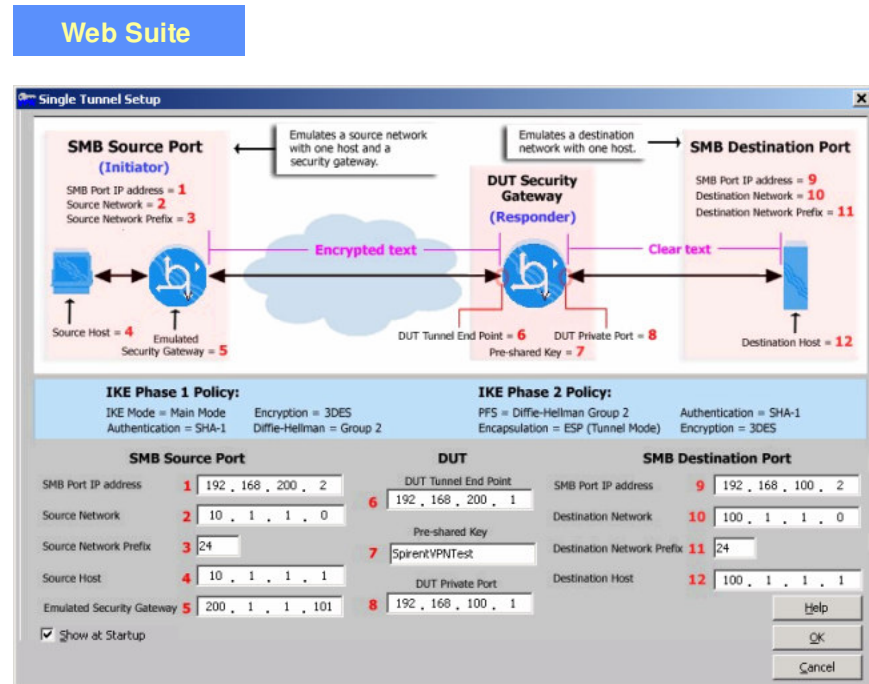
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# Performance Test Basics



# Web L4-7 Performance

- **Application**
  - Large scale L4-7 Web Infrastructure testing. Simulate high density of Web traffics
- **Test Coverage**
  - Fire Wall, Load Balancer, Web Server
- **Technology Coverage**
  - Ethernet: 10M – 10G
- **Layer 3+ Performance**
  - IPSec Phase I&II tunnels
- **Layer 4-7 Performance**
  - TCP Goodput
  - HTTP 1.0/1.1, HTTPS
  - Mail: SMTP & POP3
  - Streaming: Microsoft, RealSystem, QuickTime
  - FTP

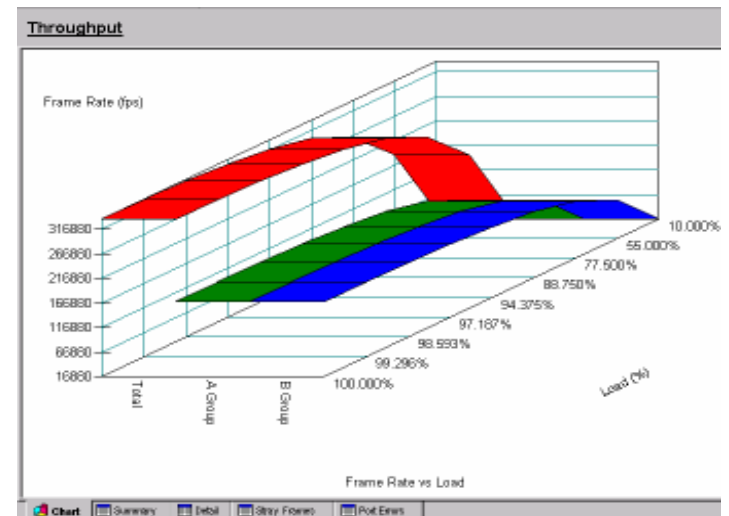


- Over 30,000 connections/second
- 1 million open TCP connections from custom TCP/IP stack
- Over 2,000 new SSL connections per second
- Sustains over 1.4 Gbps of traffic

# IP Switching Performance

- **Application**
  - Large scale IP Infrastructure QoS testing with access aggregation at the edge. Simulate thousands of logical users using multiple VLANs over a single network.
- **Test Coverage**
  - Switch, Router, Concentrator, Access Device, IP Network
- **Technology Coverage**
  - Ethernet: 10M – 10G
  - POS: OC3 – OC192
  - ATM: OC3 – OC12
  - WAN: DS1 – DS3
- **Layer 2 Performance**
  - RFC 1944, 2285, 2289
  - Traffic load per VLAN
  - Verify rate per flow per CoS (ToS, DiffServ, and VLAN priority)
- **Layer 3 Performance**
  - RFC 2432 - Multicast IP
  - MPLS

## IP Throughput



- Set Rates per flow in Mbps, Kbps, bps, or fps – Simulate the way that today's network equipment is provisioned.
- View Results per flow in Mbps, Kbps, bps, or fps – View each link or service as it is provisioned.

# Terabit/sec Scale Testing

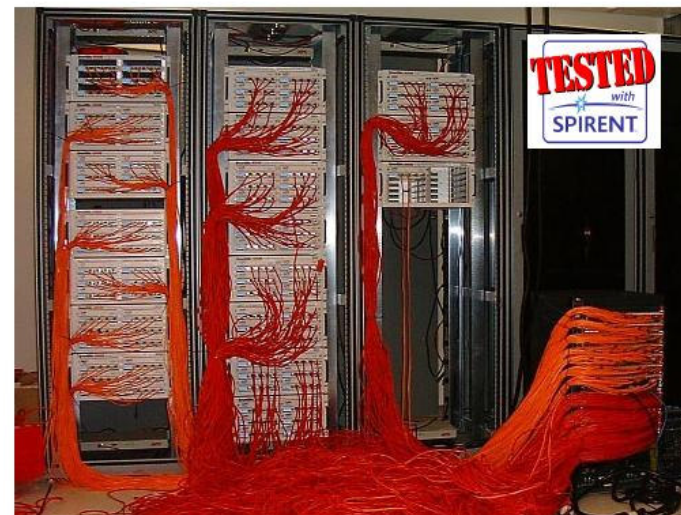


## Catalyst 6500 with Supervisor720 — Gigabit Ethernet Performance Test

### Introduction

In March 2003, Cisco Systems announced the next phase in the evolution of its market-leading Catalyst 6500 switching system, providing improved price/performance and switching capacity, plus new features such as high density 10 Gigabit Ethernet and IPv6 forwarding in hardware.

These enhancements are based around a new 720Gbps Supervisor Module, which combines a 720Gbps switch fabric and management processors on a single card; enabling up to 40 Gbps (80 Gbps full-duplex) backplane capacity per card slot. New high density, high performance, interface cards such as the WS-X6748-GE-TX, 48-Port 10/100/1000 Ethernet interface card, priced at just \$22,500 US List Price, drive the price/performance of the Catalyst 6500 to over 400Mpps whilst protecting customers' investment in existing Catalyst interface cards by ensuring complete interoperability with next-generation cards installed in the same chassis.



### Test Setup

Gigabit tests used the Catalyst 6513 chassis equipped with 410 ports, making this test the industry's largest Gigabit Ethernet test to date, confirming Cisco's claim to provide the highest GigE port density in a single-chassis



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# IP Routing Performance

## IP Routing

- **Application**

- Large scale routing emulation to test true performance of routers under real traffic and stress.

- **Test Coverage**

- Access Routers, Metro/Core Routers, Enterprise Routers

- **Technology Coverage**

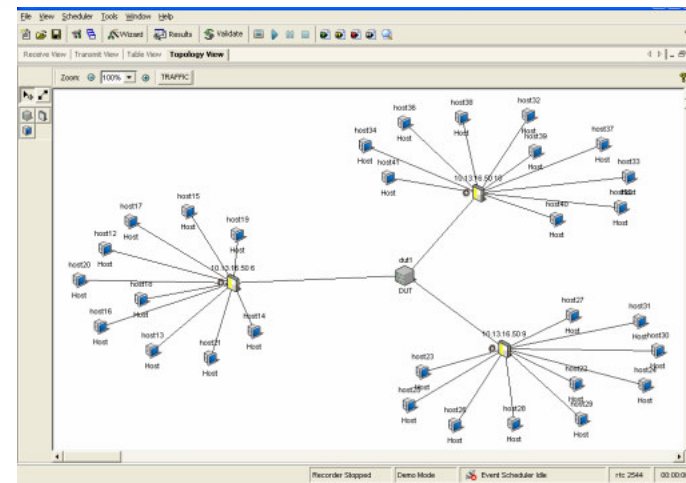
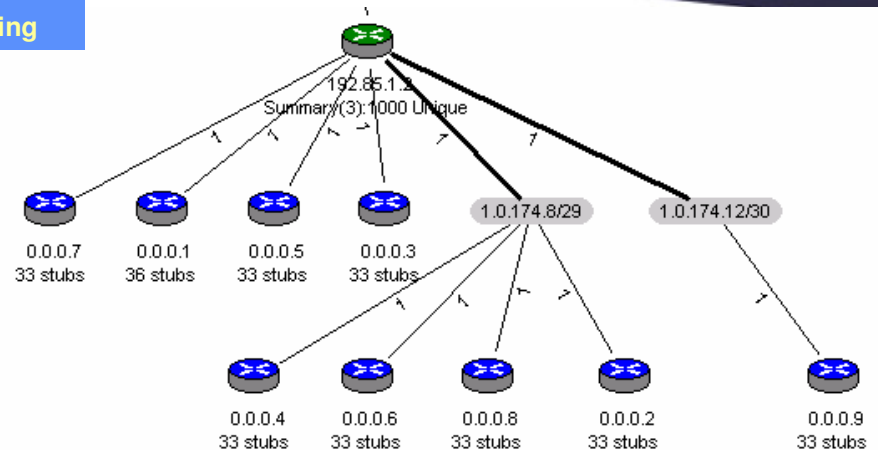
- Ethernet: 10M – 10G
  - POS: OC3 – OC192, **OC768**
  - ATM: DS3 – OC192
  - RFC 2547, Martini, VPLS, 6PE, OSPF(-TE), BGP, IS-IS(-TE), RIP, RIPng, OSPFv3, IS-ISv6, MP-BGP, MPLS (RSVP-TE, CR-LDP), PIM

- **Routing Plane Performance**

- Over million route per BGP, OSPF, RIP
  - Common Network Event
  - Route Flapping

- **Data Plane Performance**

- Millions of routes per BGP, OSPF, IS-IS, RIP
  - Throughput per tracking group
  - Latency per tracking group
  - Tracking group: QoS, Protocol, Port, VLAN, Route Flap Status, etc.



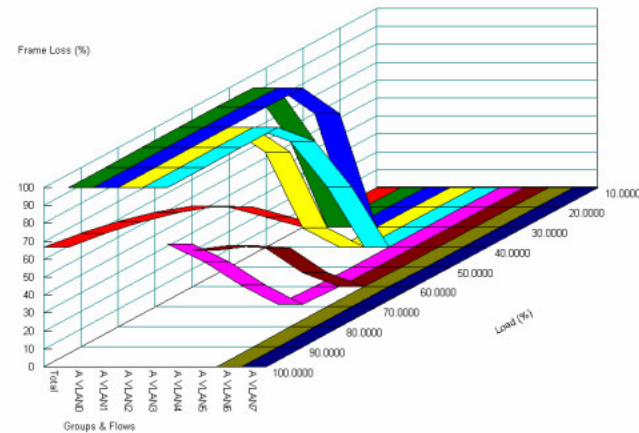
- **Easiest, highest scaleable solution on the market**
- **Millions of routes per BGP, OSPF, IS-IS, RIP**
- **Support Protocol Independent Multicast (PIM)**

# IP Storage Performance

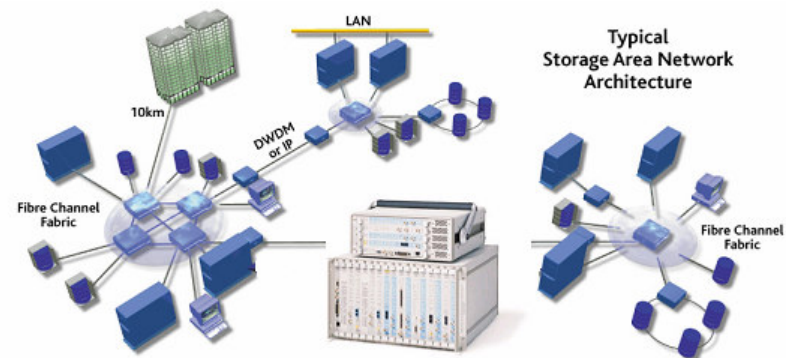


- **Application**
  - Test all aspects of multi-protocol SAN devices, Storage Routers, Directors and 10G ISLs
- **Technology Coverage**
  - Ethernet: 1-10 Gigabit
  - Fiber Channel: 1-2 Gigabit
- **Fiber Channel Performance**
  - Throughput, Frame loss
  - Latency, Latency distribution, Latency snapshot
- **Fiber Service Performance**
  - Scalability in both name servers and state change commands
  - Name server queries Response Time
- **iSCSI Emulation Performance**
  - Simulate file server, web server, database server, or workstation
  - Throughput
  - Session rate, multiple sessions per port

## IP SAN Frame Loss

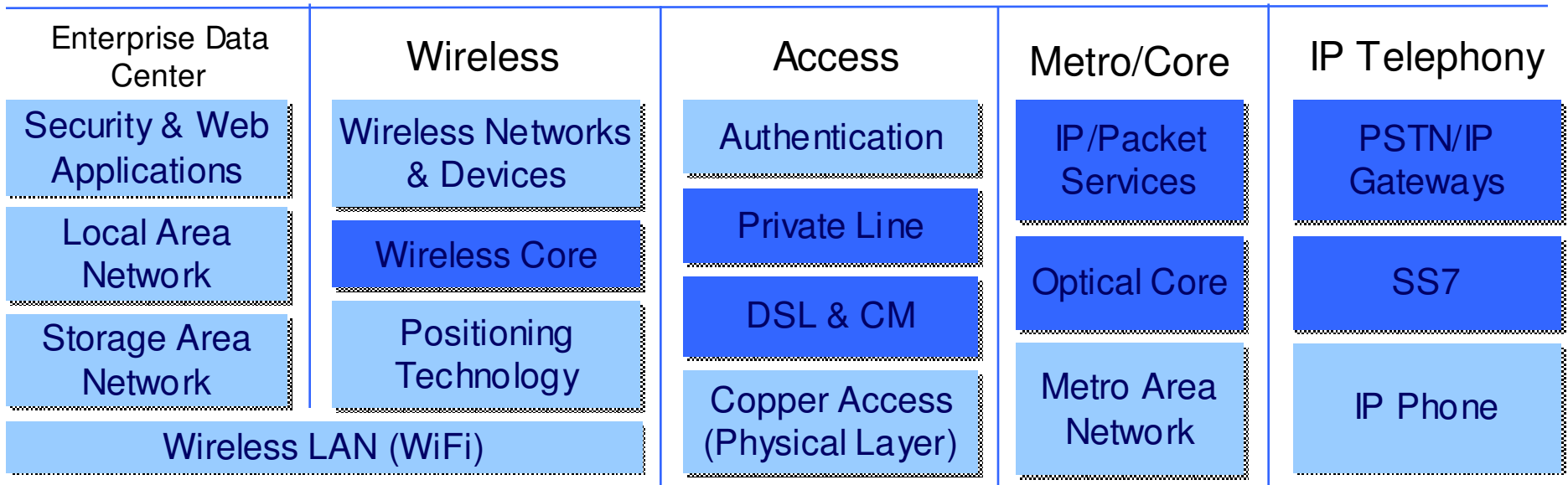
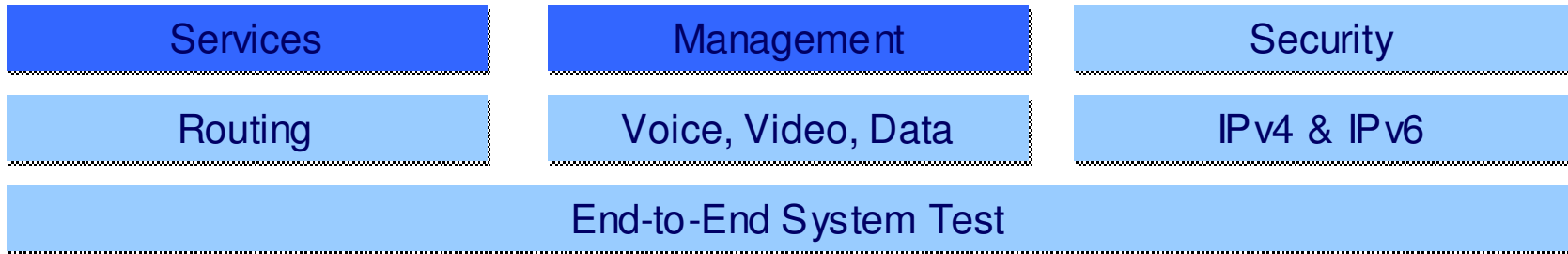


## IP Impairment Simulation



# Protocol, Device and System Performance Testing

## System & Network Wide



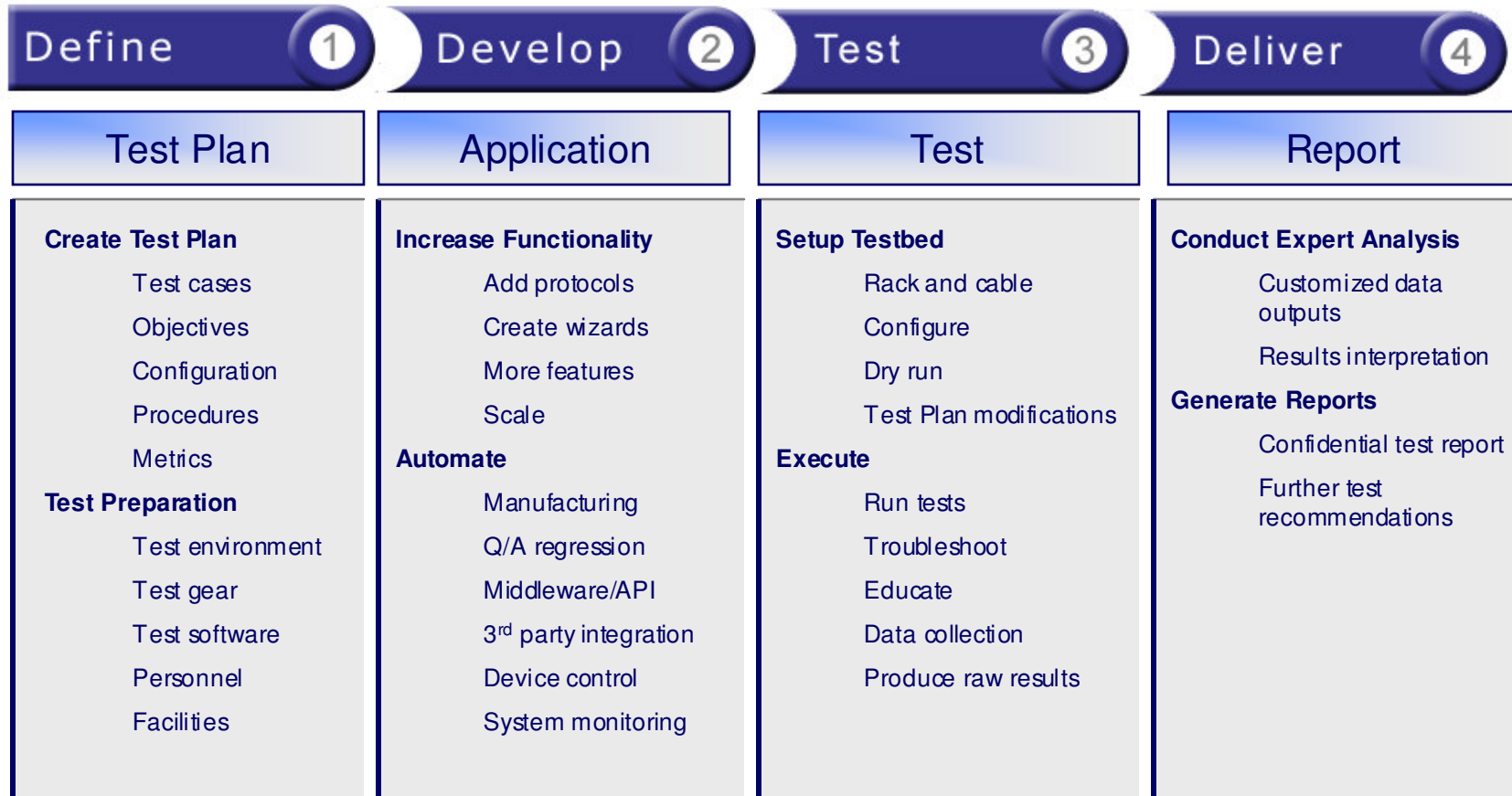
**Key:** Lab Test Performance Analysis      In the Lab and Live on the Network



# Key Issues in Growth Markets

<i>Market Segment</i>	<i>Key Issues Addressed by Spirent Solutions</i>
Wireless	E911 & new position dependent digital services. Wireless LANs - Are they scalable and secure?
Metro Networks	Can new services create new business for the carriers? New cost model for Ethernet v. SONET
Enterprise Expansion	Rollout of new, high performance, low cost, large scale, Ethernet networks. 10GbE Copper is here
Web Applications	Are they scalable and secure? Can business applications operate while under attack?
IPv6	Government and IP Telephony driving recent activity
Storage Networks	Distributed disaster recovery across 10G MANs, new technologies for 10Gbps. Do Storage networks
Convergence	IP Telephony cost, scalability, delivering high quality voice v. video v. business applications

# Test Planning





**Testing the Whole Network.**  
***The key to Understanding***  
***Application Performance***

***Thank You***  
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