Measuring Application Performance from an End User Point of View

Presented by: Wayne Allen, Fluke Networks.

The Network Seems Slow today!

- How often do we hear this statement from an application end user?
  - *From an IT professionals point of view what could it mean?*
    - Problem with the Server farm?
    - Problem with the network infrastructure?
    - Problem with the client's PC?
  - *So where do I go from here?*
- This is where the Network Guy usually has to prove to management that it is not the network.
  - *He has to prove that is not the network first!*
  - *Then show where the problem possibly is.*

The Network seems slow today!

- So our Network Guy has to chase the fault down!
  - *Too often this is the case, only to find that the problem is not in the network.*
    - Hours and possibly days spent chasing a fault, costs time and money
    - Fault found in the server area where the application is housed
      - Fault now turned over to the server team.
        - » They now spend time and effort finding the issue.
  - *So it goes on in the life of a Network Guy*
    - Chase down the next fault issue.
- In the mean time those network upgrades and refreshes get further and further behind!
  - *A key problem on a CIOs mind today is late completions of projects and projects that are over budget.*

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The Network seems slow today!

- In reality the Network Team needs to be able to act as one when chasing down problems.
  - *Infrastructure team*
    - Routers, Switches and Data Cabling and possibly WAN
  - *Server Team*
    - Virtualised Servers and Storage required by the applications
  - *Application Team*
    - Maintain the applications and their availability.
- The key to dealing with a “slow network” is to send the right people the first time!

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Understand the problem!

- "The network seems slow!"
  - *What is the end user really experiencing?*
    - Oracle app is not responding the way it usually does?
    - Web surfing seems slow?
    - Citrix app not updating screens quickly enough?
    - Printing now takes forever?
      - » And so the issues go on...
  - *Well, all the indicators on the NMS are green!*
    - Where to now?!

- Our networks are complex and application paths can be complex to decipher.

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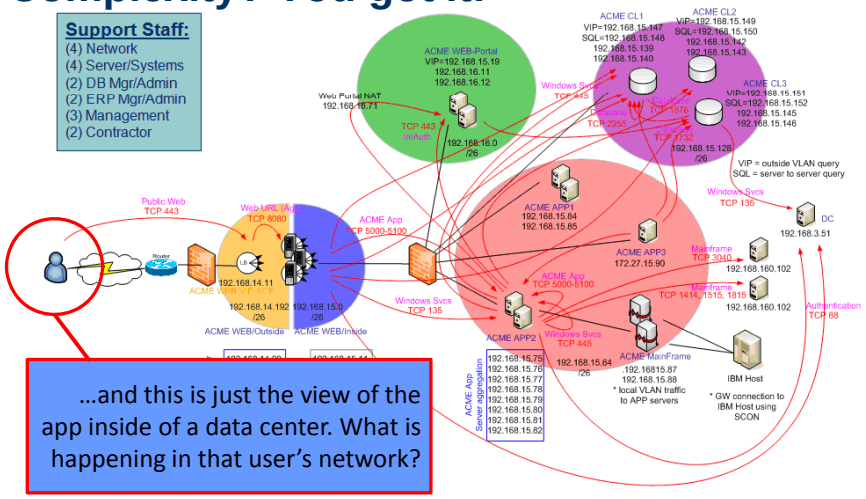
Complexity? You got it!

Support Staff:
(4) Network
(4) Server/Systems
(2) DB Mgr/Admin
(2) ERP Mgr/Admin
(3) Management
(2) Contractor



…and this is just the view of the app inside of a data center. What is happening in that user's network?

Figure 1.1 real application environment for a single customer facing application

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Root Cause Analysis (RCA)

- Without a history of normal network operation, it is difficult to determine what is not normal
- Keeping a history of:
  - *Utilization levels*
  - *Roundtrip Latencies*
  - *Protocol Distributions*
  - *Packet captures of working applications*
  - *Path Analysis*
- Allows us to get to the root of the problem, without chasing symptoms that are not really part of the problem

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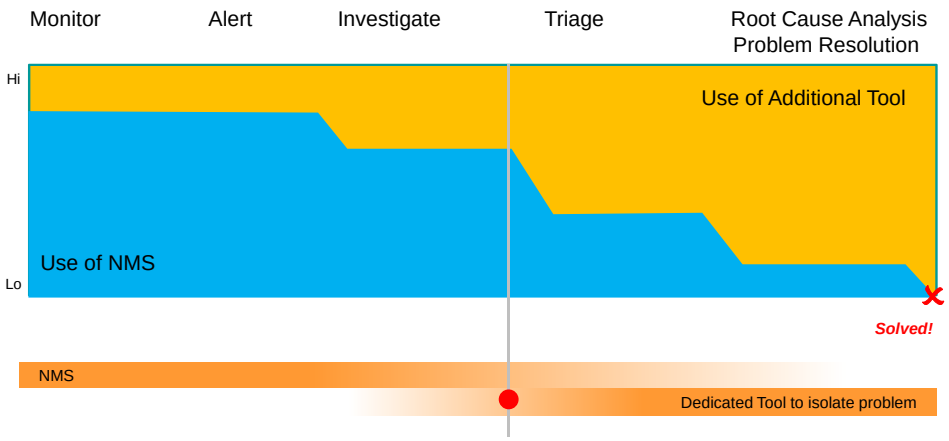
Use of NMS in User Workflow



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Best Practices

- **Getting in the Path of the Packets**
  - *No Network Documentation*
  - *Understanding Application Dependencies*
  - *Tapping Technologies*
  - *Virtual Machines*
- **Capturing all the Packets**
  - *High Bandwidth Utilization*
  - *What Happened Yesterday at 3pm?*
- **Discovering Problems before the Customer Does**
  - *Network is the backbone for everything*
  - *Automatically picking out problems from Gigabytes worth of data*
- **Resolving Problems in a Timely Manner**
  - *Need better understanding of how applications work*
  - *Remote offices*

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Getting in the Path of the Packets

- Why is this important?
  - *In order to analyze the application traffic and troubleshoot the problem, we must have the application packets in the capture buffer*
  - *The only way to get these packets in the buffer is to get in the path of the packets between the client and server*

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Getting in the Path of the Packets

- Knowing the flow of the packets
  - *Often times network administrators will think they know the path packets are taking through the network*
  - *In many cases however, the packets are taking a different path, making the troubleshooting process much more difficult*
  - *Without knowing the exact path, we cannot guarantee that we are in the path of the packets*
  - *Not only must we know the Layer 3 flow of the packets, but we also need to know the Layer 2 flow of the packets*

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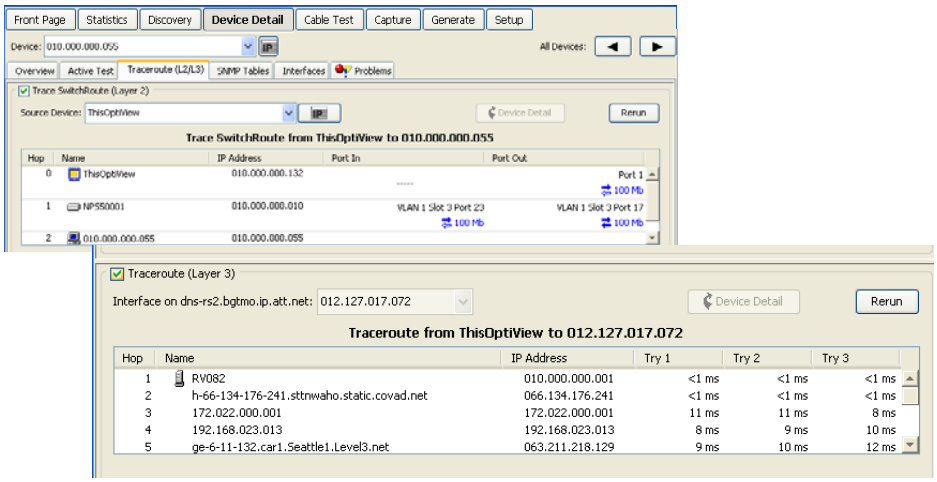
Getting into the Path of Packets A Layer 2 and Layer 3 Traceroute



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Getting in the Path of the Packets

- Once we know the exact path of the packets, it is time to get into that path
- There are three common methods of getting in the path and capturing the packets
  - *Hub*
  - *Span*
  - *Tap*
- Each of these methods has its own pros and cons

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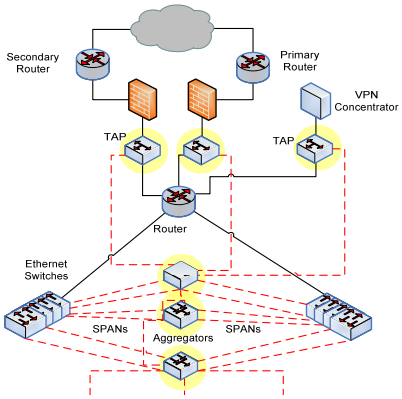
Tap Deployment

- Analysis equipment can be quickly connected to the network, without the need for configuration changes
- Aggregators can be used to merge the traffic from multiple taps into a single stream
- This allows a single analyzer to monitor traffic at multiple locations as well as redundant paths



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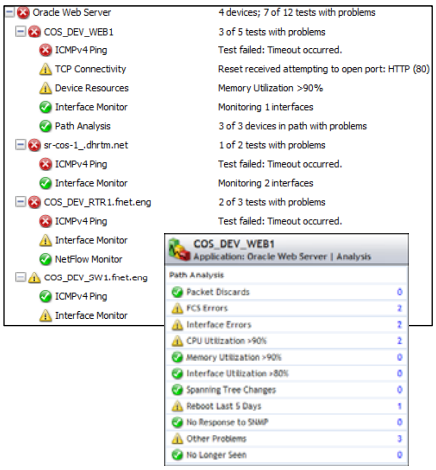
Getting into the Path of the Packets

Path and Application Infrastructure Analysis

Now we have the path of the application from the client to the DC, we need to know how that path is performing.

Collecting performance data along that link helps identify problems along that path allowing us to analyze the underlying network infrastructure required to deliver mission critical application



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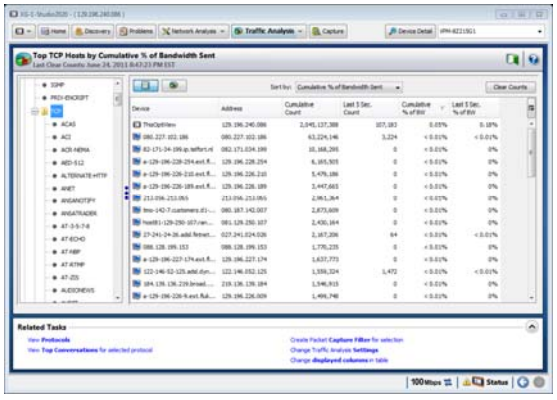
Host Conversations for the Application

- Very Important to know who else is using the application
  - *Are they experiencing problems*
  - *Are they using the same paths*



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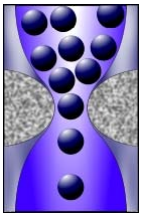
What are we really seeing out there?

- Very few outright network fails
  - *Faults tend to be subtle*
    - Poor port performance
    - Server memory overload
    - Performance issues within the virtualised servers
    - Deteriorated data cabling or bad patch cords
- What this gives us is a bottleneck
  - *A incident point that slows application performance.*



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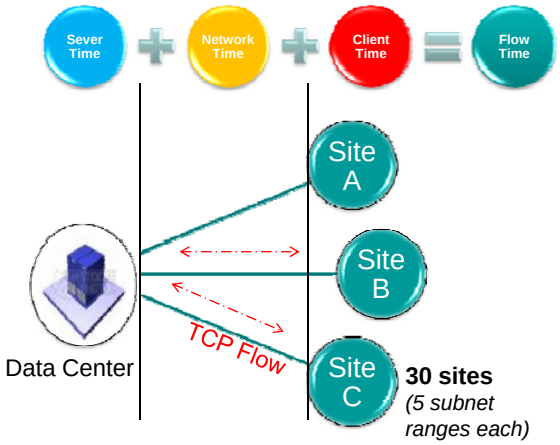
Introducing Performance Bottleneck Analysis (PBA) Trend Metrics:
Quickly isolate fault domain



Patent Pending Measurement Approach

- For each TCP Flow, determine the time spent on server, network and client
- Only 1 Trace needed
- Aggregated by Application, Server, App-Site and Site
- Detail TCP/IP Health Metrics available for drill down

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PBA indicates fault domain

Time spent on Server

Time spent on network

For the IT Guy

- Correlates change in user experience to network, server change status
- Low level metrics refine fault domain isolation

No Complaint

Flows take 4 sec to complete

User Complained

Flows now take 7 sec with large increase in time spent on server.

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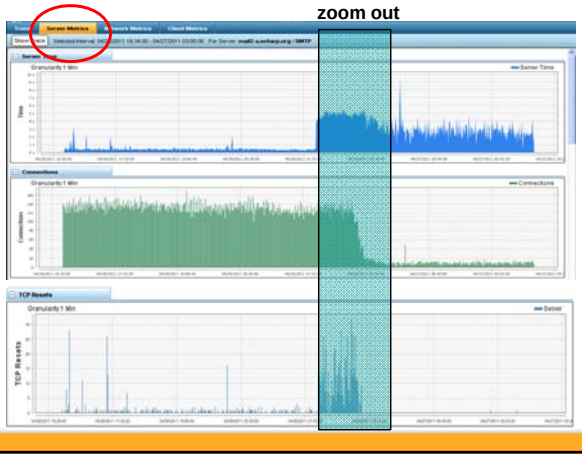
Detailed metrics verify root cause

Verify cause of change in PBA with well-understood TCP/IP metrics intelligently grouped

zoom in/ zoom out



Trend tab
- *Client time / Network time / Server time*

Server Metrics
- *Server time*
- *Connections*
- *Throughput*
- *Data volume*
- *TCP resets*
- *Zero windows*

Client Metrics
- *Client time*
- *Data volume*
- *TCP reset*
- *Zero window*

Network Metrics
- *Network time*
- *Network latency*
- *Data volume*
- *Re-transmissions*
- *DLC utilization*

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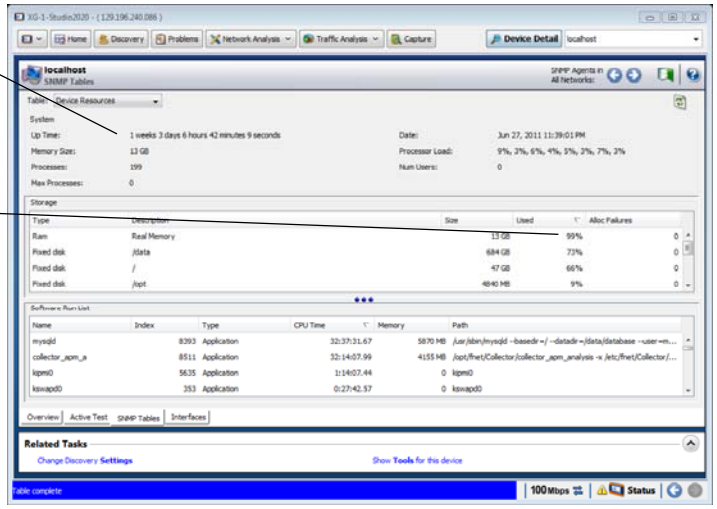
Delve into the identified Root Cause

Virtual Server details

RAM utilization 99%



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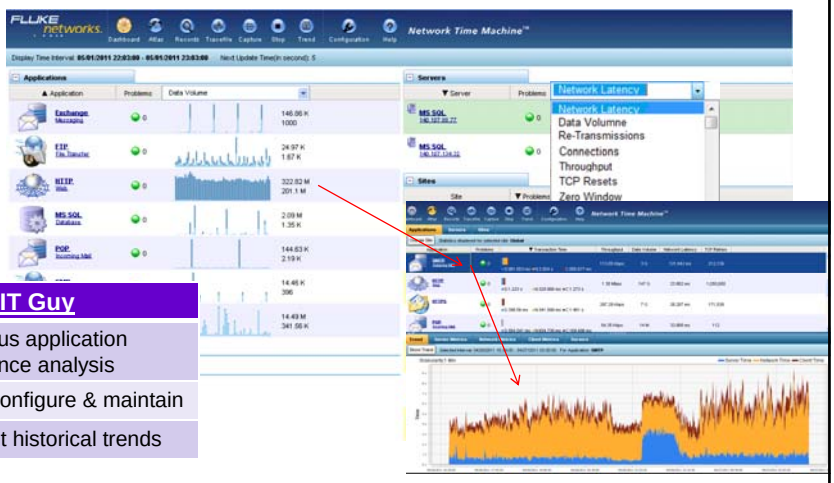
Monitor application performance



For the IT Guy

- Continuous application performance analysis
- Easy to configure & maintain
- Persistent historical trends

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Alarm history indicates health trend

For the IT Guy

- Alarm report trends health
- Server, Site and Application health perspective

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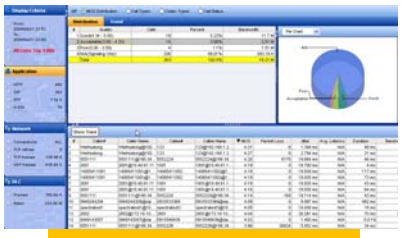
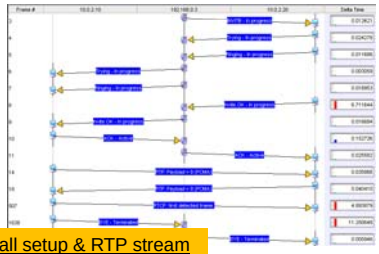
Isolate Voice and Video issues quickly

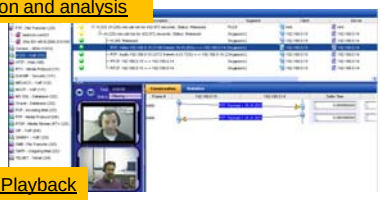
Ensure user quality & optimize network performance by continuous assessment of service delivery with detail analysis



Video/Voice Call detail assessment



Call setup & RTP stream extraction and analysis



Simultaneous Video/Voice Playback

For the IT Guy

- Track quality & call status for each call
- Quick time to root cause
- Unique Video Analysis

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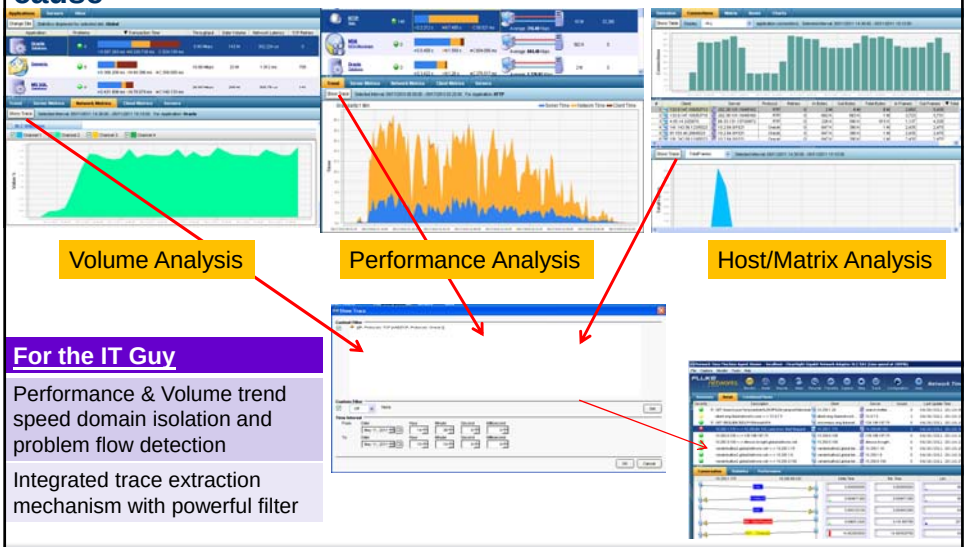
Data mining: Quickly find the packets to verify root cause



For the IT Guy

- Performance & Volume trend speed domain isolation and problem flow detection
- Integrated trace extraction mechanism with powerful filter

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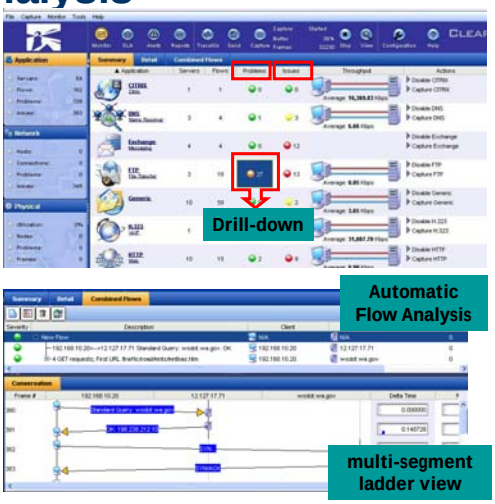
Application Centric Analysis on-board for detail packet level analysis

- Summary view quickly identify problem with application
- Flow base analysis with automatic ladder view quickly identify performance issues
- Intuitive drill down makes problem isolation a snap
- Compatible with WireShark decode engine



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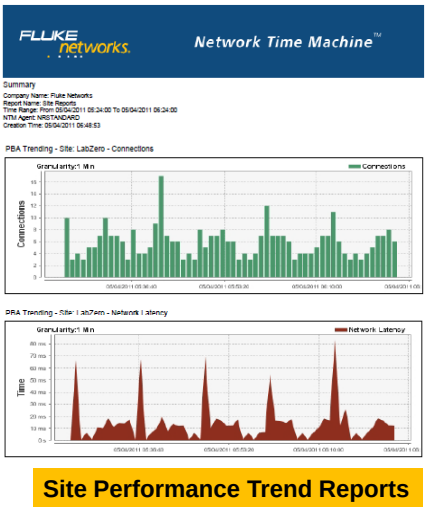
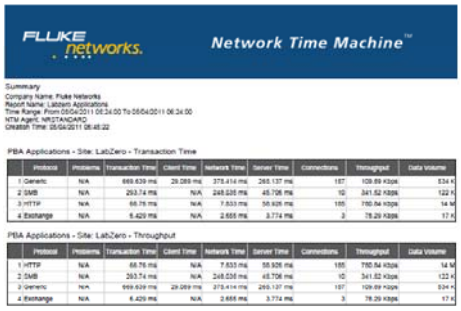
The “Boss” View



Site Performance Trend Reports



Slowest Site Performance
By Network Latency

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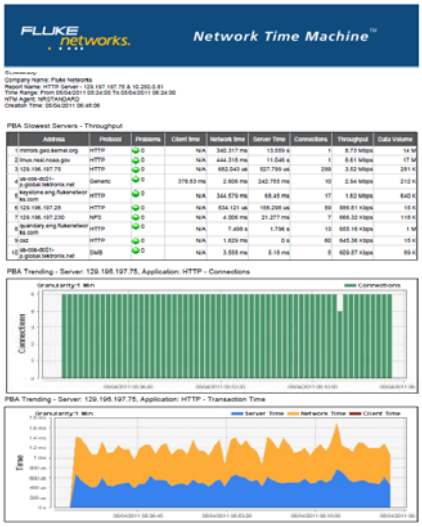
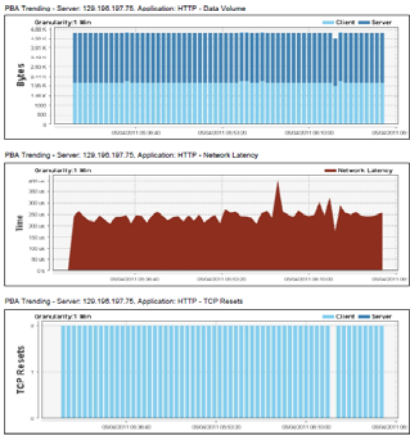
Application-Server Health Report





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PBA Changes the Slow Network Game

- Performance Bottleneck Analysis sorts the finger pointing for the IT Guy
  - *Isolates the fault domain*
  - *Indicates where the issue(s) may be*
  - *Allow rapid problem rectification*
  - *Allows the IT team to be pro-active*
    - Don't have to wait for that call – The Network seems slow!

- Coupled with the right RCA tools
  - *IT Guy is the hero again*
  - *Reduced fault time means happier customers*
  - *Reduced spending on trouble tickets*

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