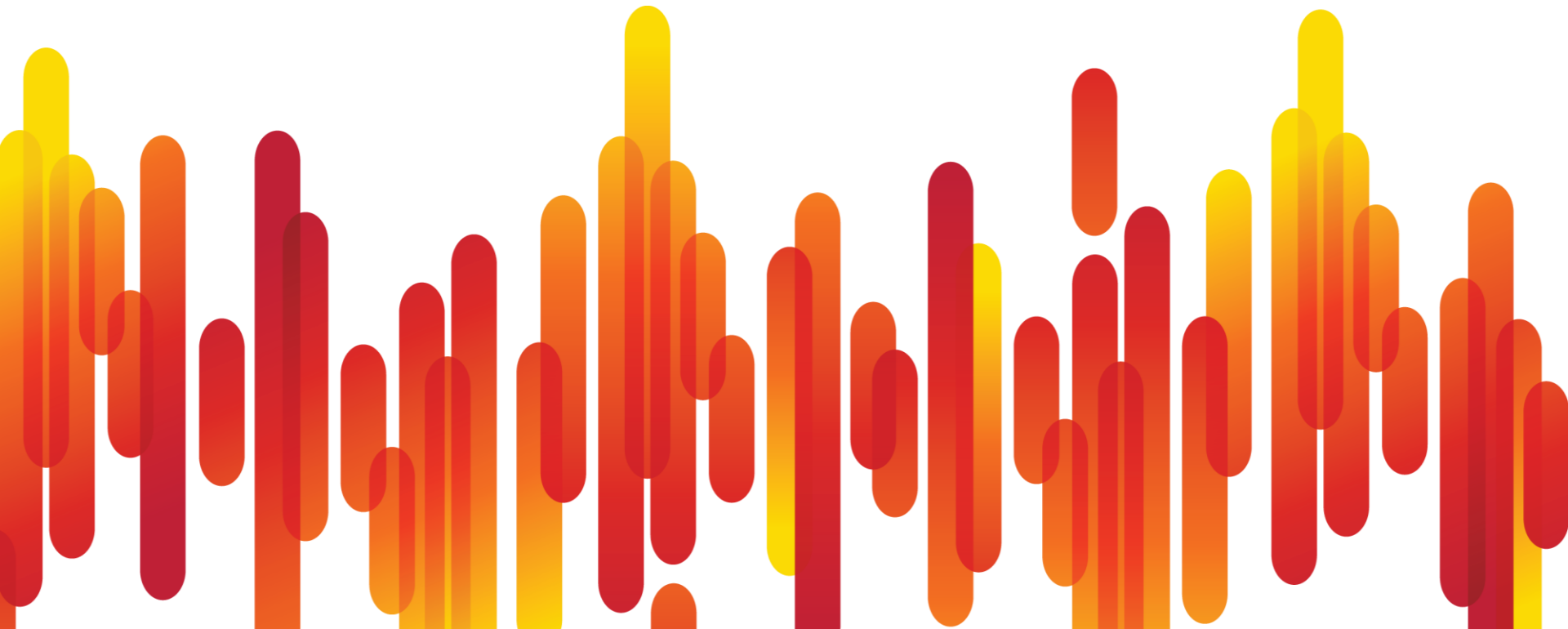# Wide Area Application Services (WAAS) Troubleshooting

Bhavin Yadav, Technical Support Engineer

Cisco Support Community – Expert Series Webcast

- Today's featured expert is Cisco Support Engineer **Bhavin Yadav**

- Ask him questions now about **WAAS Troubleshooting**

Bhavin Yadav

Thank You for Joining Us Today

Today's presentation will include audience polling questions

We encourage you to participate!

Thank You for Joining Us Today

If you would like a copy of the presentation slides, click the PDF link in the chat box on the right or go to

https://supportforums.cisco.com/community/netpro/data-center/waas

Or, https://supportforums.cisco.com/docs/DOC-20023

Polling Question 1

What is your level of experience in troubleshooting WAAS?

a) I theoretically know WAAS, but no practical experience.

b) I know WAAS concept but rarely work with WAAS for troubleshooting purpose.

c) I know basic troubleshooting, but no idea about WAAS specific troubleshooting.

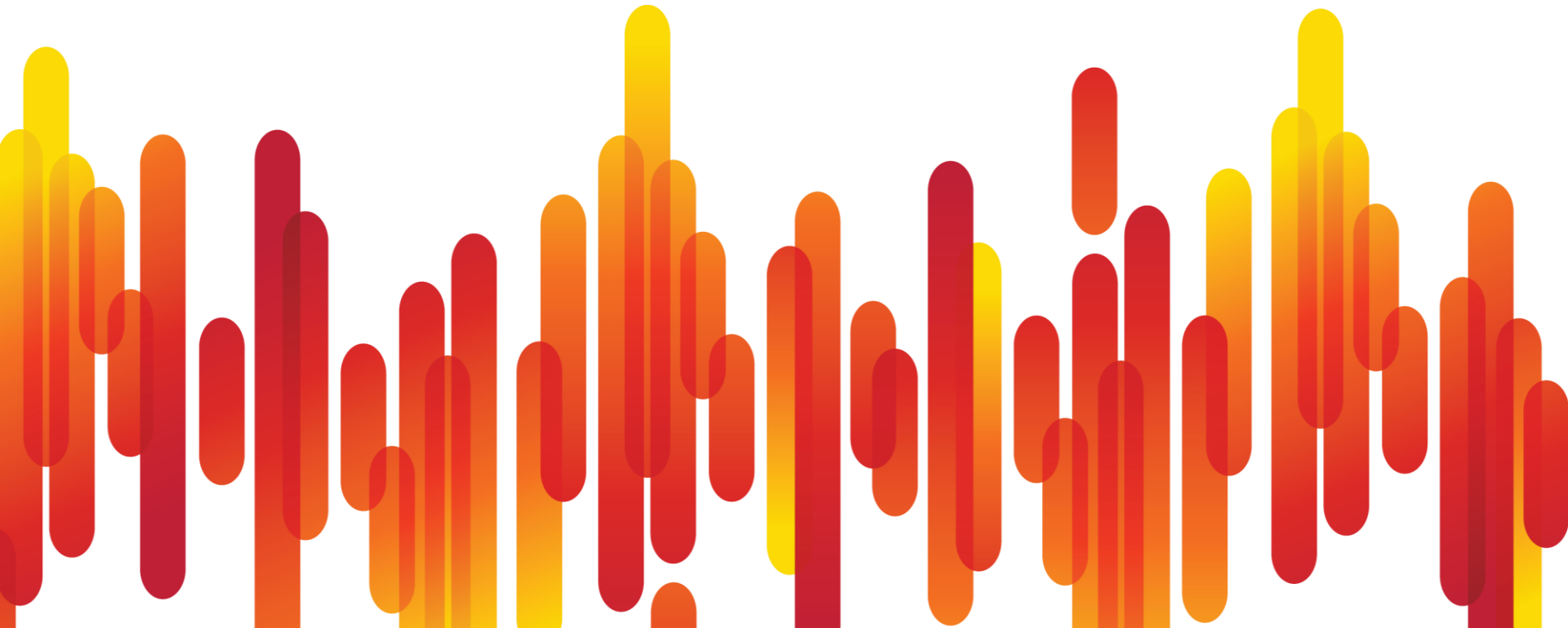d) I know most of the WAAS concepts and know what to collect and when.
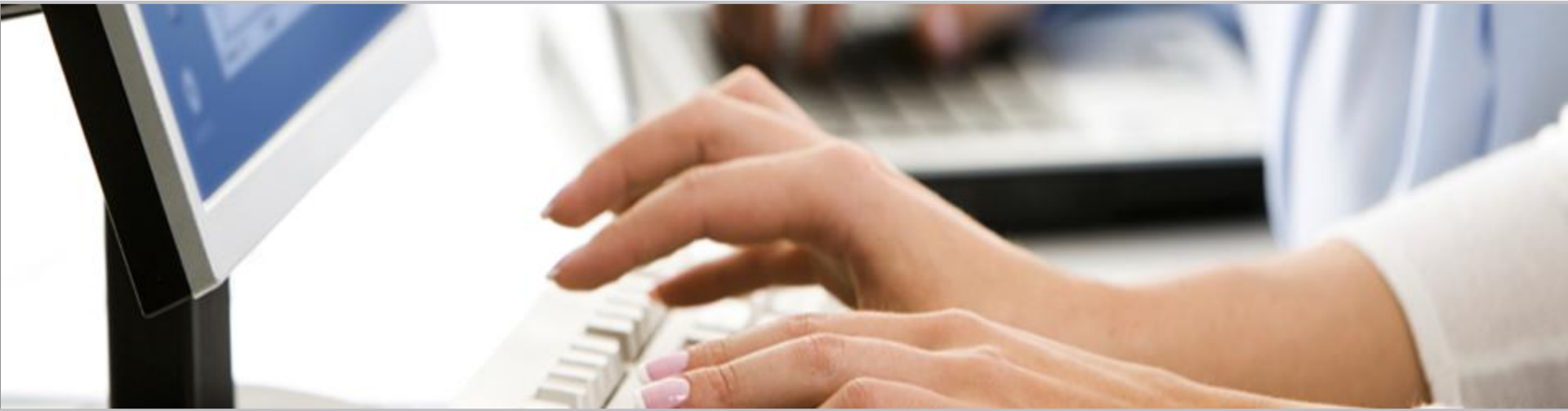
Submit Your Questions Now

Use the Q&A panel to submit your questions. Experts will start responding those

WAAS Troubleshooting

Bhavin Yadav, Technical Support Engineer

Agenda

- Introduction to WAAS Troubleshooting

    Basic troubleshooting

    Information to collect

    Troubleshooting tools

    Various logs and CLI commands to help

- Major Application Optimizations (AO) troubleshooting

- Summary

What is covered…

- To help you understand the troubleshooting flow

- How can you do primary diagnosis yourself

- Troubleshoot yourself without interrupting production traffic

- What data to collect before troubleshooting

- Help Cisco TAC expedite the resolution by providing them the "right" logs

Starting check points

- Is this really WAAS Problem?

- Asymmetric Routing

- Modified Policies

- Resource crunch

- PreCompressed

- Peer issues

- Traffic flow thru VPN / Firewall / security devices
  (Encryption, Digitally Signed traffic, etc)

Polling Question 2

What is the first thing you do when you encounter issues with WAAS?

a) Try to understand the problem yourself. You can "google" around

b) Ask for help from a WAAS expert person in your group

c) Look at show tech and alarms

d) Open TAC case with Cisco

Troubleshooting Process

1. Write a clear problem statement

2. Gather the facts
    1. How many sites are affected?
    2. Is this one site issue / multi-site issue?
    3. Is this one server problem / multiple server problem?
    4. Is this affecting one user / one subnet / one network / multiple?

3. Narrow down the list of possible problems/causes
    1. Any recent network device installation / un-installation?
    2. Any recent unexpected reboot / reload?
    3. Any recent server installation?
    4. Any recent new site installation?
    5. Any change in ACLs / gateways?

4. When a variable changes, gather the facts again

Troubleshooting Software Issues

- Software version issues

  Make sure you are running right code on Wide Area Application Engine (WAE) / CM.

  i.e. CM needs to be running the latest code out of your WAAS farm.

  Make sure to select right image:

  i.e. Accelerator only / Universal / NPE / SRE images.

Troubleshooting Hardware Issues

- Boot issues

  Watch boot sequence with console and monitor connected

  Initial boot will log to monitor, and then switch to console only output

  i.e. VGA display will terminate when it starts booting Linux.

  Incorrect BIOS settings may change boot order or disable logging to console

  We do not suggest changing any BIOS settings.

- Check disk and RAID health (and firmware version)

  show disks details

  show disks tech-support

- Check syslog.txt for boot and failure messages

How to Collect "show tech" from WAAS

- Use the copy command

```
wae#copy tech-support ?

   disk   Copy to disk

   tftp   Copy configuration to TFTP Server
```

- Or use the show command and log output of screen to text file

```
show tech-support
```

Collect Sysreport from WAAS

- From the CLI

  1. Issue the command
     ```
     copy sysreport ftp <server-ip> <remote-directory> <remote-file-name>
     ```

  2. Enter username and password for FTP server when prompted

  3. `Or copy sysreport disk <filename>`

- From the GUI

  1. https:\\wae_ip:8443

  2. Login to the GUI

  3. Select - Cisco WAE / Utilities / Support

  4. Select Full then Download

  Note: During the download of the sysreport, the performance of the WAAS may be affected.

Collect Crash and/or Coredump files from WAAS

- Kernel crash files are found at (where X is a number):

    /local1/crash/X

- Core files are saved to /local1/core_dir

- Background process automatically compresses (gzip) the core files

- Presence of file in crash OR core_dir folder will raise an alarm

- Core filename will be similar to:

    ```
    Filename:
     core.<process>.<build_version>.cnbuild.<PID>
    Example: core.snmpced.4.1.3b.b9.cnbubuild.5132
    ```

Introduction to WAAS Troubleshooting
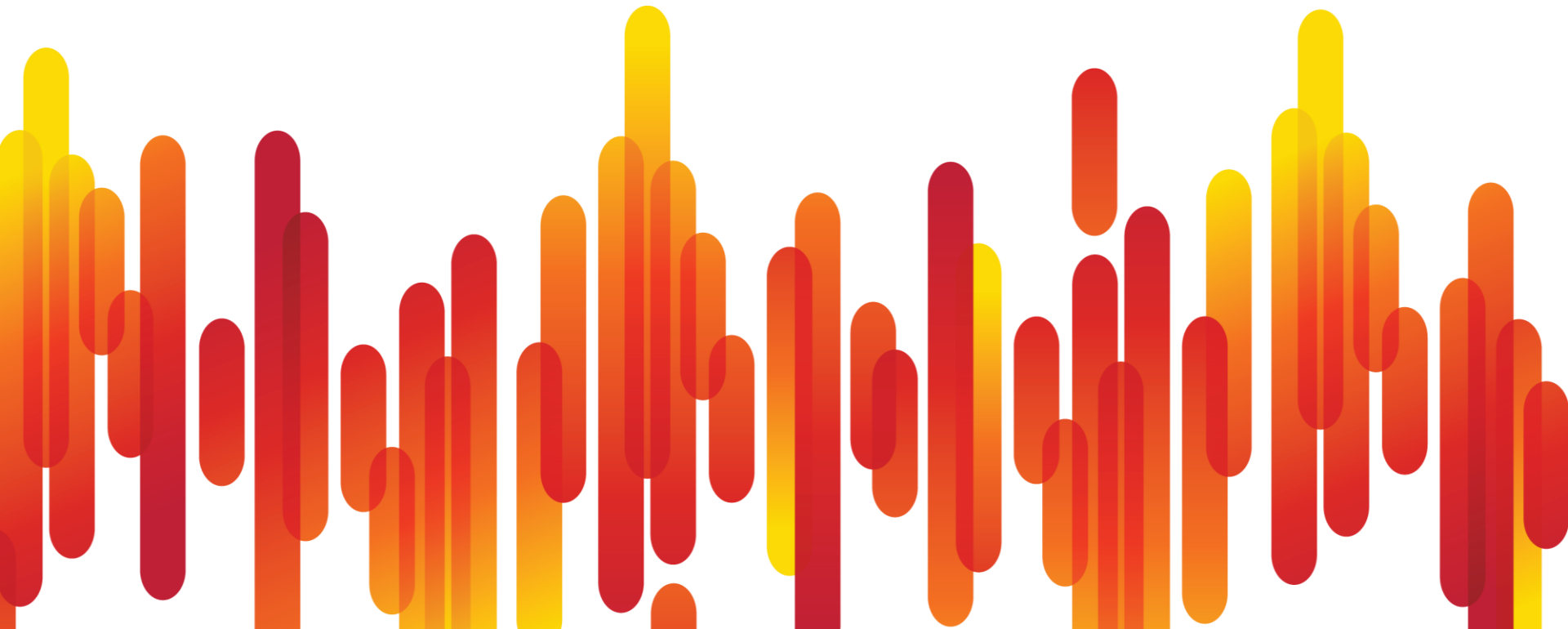
WAAS with WCCP

- Register to the router's local interface address if the WCCP client is layer 2 adjacent

- Register to the router's highest loopback address if the engine is not layer 2 adjacent

- Do NOT register to a router's virtual address

  Hot Standby Router Protocol (HSRP)

  Gateway Load Balancing Protocol (GLBP)

  Virtual Router Redundancy Protocol (VRRP)

Web Cache Communication Protocol (WCCP) Troubleshooting

- Make sure services are configured correctly

  o GRE, L2, Hash, Mask

  o Service groups on proper interfaces

  o redirect exclude in statement to avoid any routing loops

- Interfaces are configured correctly on both sides (WAAS and IOS)

- Make sure you are running correct IOS version

http://www.cisco.com/en/US/prod/collateral/contnetw/ps5680/ps6870/white_paper_c11-608042.html

Information needed to troubleshoot WCCP

- ### On the WAAS device

  ```
  show wccp gre  → To check the counters
  show wccp router  → To check the routers connected to
      WAE
  show wccp wide-area-engine  → which WAE is lead WAE
  ```

- ### On the IOS router/switch

  ```
  show ip wccp
  show ip wccp <service_id> service
  show ip wccp <service_id> detail
  show ip wccp interface detail
  ```

  Note: *Not all commands are available in all IOS versions. Some of the commands are hardware and software version specific.*

WCCP Debugs

- Router
  - debug ip wccp packet
  - debug ip wccp events

- WAE
  - debug wccp all

- Packet capture over udp port 2048 (on WAE)

Inline Troubleshooting

- Verify Cabling, speed and duplex settings

- LED status

- The syslog.txt shows the inline detected during bootup logs

  ```
  Copyright (c) 2004-2005 Silicom.
      ACPI: PCI interrupt 0000:04:04.0[A] -> GSI 16 (level, low)
         -> IRQ 16
      e1000bp: eth2: e1000bp_probe: Silicom PXG4BPI series
         adapter ...
  ```

- `show hardware` → shows Inline hardware detected

- `show interface inlinegroup` → shows correct operating mode

- `show interface inlineport` → shows both UP and RUNNING

- The inline card is configured correctly and monitoring the correct Vlan(s)

Major Application Optimization (AO) Troubleshooting
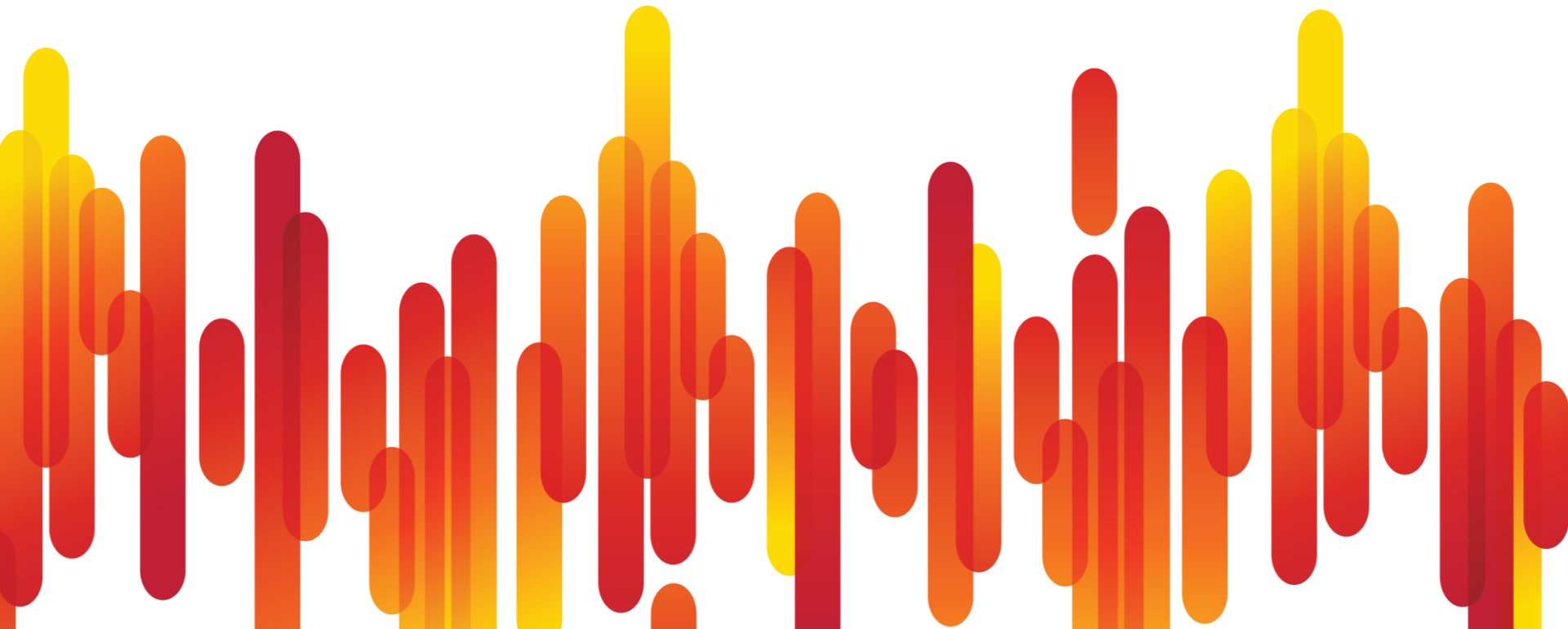
Auto-discovery Troubleshooting

- Policy-engine definition is correct on both peer devices

    Applications defined

    Classifiers have correct matching criteria and in correct order

    Maps point to correct classifiers and have correct optimization/acceleration

- View statistics to identify potential issues with auto-discovery

    - `show statistics auto-discovery`

- Is the connection being optimized, pass-through, or in auto-discovery?

    - `show statistics connection <filter>`

- Use packet captures to verify whole 3-way tcp-handshake

- Avoid Asymmetric Routing

    SYN, SYN+ACK, and ACK to the SYN+ACK are all seen

    TFO options are negotiated correctly, and connection optimized

    Note: Filter can be client ip / server ip / conn-id / closed / optimized / pass-through / client port / server port, etc.

Auto-discovery Troubleshooting

- Does the problem happen with only TFO enabled, and other optimizations (DRE, LZ) and accelerations (AOs) disabled?

- Is the connection being optimized or pass-through?
  - `show statistics tfo detail`
  - `show statistics connection <filter>`

- View details about the optimized connection
  - `show statistics connection <filter> detail`

Data Redundancy Elimination (DRE) and Persistent Lempel-Ziv (PLZ) troubleshooting

- View details about the optimized connection
  - `show statistics connection <filter> detail`

- Review the peer DRE and PLZ statistics
  - `show statistics peer dre detail`

- Review the global DRE and PLZ statistics on local WAE
  - `show statistics dre detail`

- Checkout compression or encryption, which have little redundancy or compressibility which poisons the DRE cache with unusable data

Central Manager Troubleshooting

- Make sure device is configured as Central Manager.

- WAE talks to Central Manager over port 443.

- Primary and standby Central Managers communicate on port 8443

- Central Manager's CMS database backup
  o Can be restored to a device in your lab
  o Then access the CM GUI on that restored device
  o Provides visibility to consolidated statistics in graphs and tables

Tools for Analyzing Connectivity

- **ping**
  - ICMP based, so is not redirected through WAAS
  - Can ping with different size packets to identify best MTU
- **telnet**
  - TCP based, and is redirected, but may be pass-through in WAAS policy
  - Can test specific ports (like port 80 for HTTP)
- **ssh**
  - TCP based, and will redirect through WAAS
- **traceroute**
  - Trace network route to remote host
  - May want to use one of the free 3rd party TCP traceroute tools

Polling Question 3

Which Application Optimization (AO) do you encounter most issues with?

a) Common Internet File System (CIFS)

b) Messaging Application Programming Interface (MAPI)

c) HTTP Optimization

d) Secure Sockets Layer (SSL)

e) Generic

Submit Your Questions Now

Use the Q&A panel to submit your questions. Experts will start responding those

Standard Data Set for any AO troubleshooting

- Packet captures of problem replication (complete, end-to-end)
  - A complete, end-to-end set of captures from beginning to end of the test, capturing the failure, is often the best way to identify and isolate root cause

- A sysreport taken immediately before and after the test

- Complete description of each test
  - Client ip address
  - Server ip address
  - File and folder details
  - Server details
  - Client details
  - Failure / Success

  Note: Incase if you have intermittent failures, a Good set of working and non-working scenarios is suggested.

Standard CLI command Set for any AO troubleshooting

- **Make sure AO is licensed, enabled and running**
  - `show accelerator <AO_name>`

- **View statistics for failure reasons**
  - `show statistics accelerator <AO> detail`

- **Policies are correctly configured**
  - `show running-config | include <AO>`

- **Check alarm history**
  - `show alarms history detail`

Standard AO troubleshooting

- Are connections failing or slow with AO enabled?
  - Can you see if this site or application fail with TFO/DRE/LZ without AO?
  - Does it fail with TFO/DRE/LZ?
  - Does it fail when using pass through connections?

- To disable AO from the equation we could do one of the following:
  - disable AO globally
  - create a custom classifier/policy for certain traffic to not use AO
- You can use client ip / server port to create a policy to allow pass through traffic
- If the problem occurs with TFO, TFO/LZ, or TFO/DRE/LZ then troubleshoot from that perspective
  - Duplex mis-matches, network issues, firewall issues, packet shaper, …
  - Application may not like re-packetization due to TFO/DRE
- Creating policy is a good way as that is less disruptive to other traffic and controlled testing

Troubleshooting SSL AO

- Check CM Secure Store status

  CM Secure Store status should be initialized and open

  - `show cms secure-store`

- Check alarms for any certificate / secure store issues

  - `show alarm history detail`

- Check that the SSL Accelerated Services and certificates are defined correctly in the CM GUI

  - `show crypto ssl services accelerated-service`
  - `Show crypto certificates`

- Check that the dynamic policy is active on the core WAE

  SSL dynamic policies for the defined SSL Accelerated Services should be active on the core WAE

  - `show policy-engine application dynamic`

  Check that DNS is configured properly and all names and addresses resolve (forward and reverse)

References

- **Support forums**
  https://supportforums.cisco.com/

- **Configuration Guides**

- http://www.cisco.com/en/US/partner/products/ps6870/products_installation_and_configuration_guides_list.html

- **Release notes**

- http://www.cisco.com/en/US/partner/products/ps6870/prod_release_notes_list.html

- **References guides**

- http://www.cisco.com/en/US/partner/products/ps6870/prod_command_reference_list.html

- **Error and System Messages**

- http://www.cisco.com/en/US/partner/products/ps6870/products_system_message_guides_list.html

Polling Question 4

How useful was this presentation?

a) This was very informative presentation and will help me during my day to day WAAS issues

b) This presentation needed more in depth details.

c) I wanted to see some information on configuration

d) This presentation was somewhat useful

e) This presentation was not useful to me.

Q&A

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If you have additional questions, you can ask them to Cisco Experts Peter Van Eynde and Michael Schueler until Nov. 18th

https://supportforums.cisco.com/message/3482826

You can watch the video or read the Q&A five business days after the event at

https://supportforums.cisco.com/community/netpro/ask-the-expert/webcasts

CSC Expert Series Webcast in Spanish

Topic: Cisco Unified Communications Networks Upgrade

Tuesday, November 29th, at

     7:00 a.m. Pacific (UTC -8)

     9:00 a.m Mexico city (UTC -6)

     4:00 p.m Madrid   (UTC +1)

Join Cisco Technical Solutions Architect and CCIE

Alberto Aguayo

He will discuss main reasons to upgrade and maintain your Cisco Unified Communications network, as well as get best practices for successfully migrating a Unified Communications networks with minimal impact to downtime of live networks

During this interactive session you will be able ask all your questions related to this topic.

Register for this live Webcast at

- http://cisco-apps.cisco.com/pcgi-bin/sreg2/register/banner.pl?LANGUAGE=S&METHOD=D&TOPIC_CODE=S15573&PRIORITY_CODE=

Next CSC Expert Series Webcast in English

Topic: Service Provider IPv6 Deployment

Tuesday, December 6th , at
    8:00 a.m. Pacific Time - San Francisco (UTC -8)
    11:00 a.m. Eastern – New York (UTC -5),
    4:00 p.m. GMT - London

Join Cisco Distinguished Support Engineer and CCIE

Salman Asadullah

He will focus on service provider IPv6 deployment techniques in core networks, which will help network designers and administrators understand IPv6 operation and implementation options for native IPv4 and (MPLS) core environments.

During this interactive session you will be able ask all your questions related to this topic.

Register for this live Webcast at

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Next CSC Expert Series Webcast in Japanese

Topic: Troubleshooting NAT and Common Performance Issues on Cisco Firewall Products

Wednesday December 14, at
    10:00 a.m JST – Tokyo (UTC +9),

Which is Tuesday, December 13 , at
    5:00 p.m. Pacific Time - San Francisco (UTC -8)

Join Cisco Support Engineer and double CCIE

Zhao Qin

He will discuss how to troubleshoot NAT configurations and common performance issues on Cisco Firewall Products with focus on Adaptive Security Appliances (ASA) and Firewall Services Modules (FWSM).

During this interactive session you will be able ask all your questions related to this topic.

Register for this live Webcast at

http://tools.cisco.com/gems/cust/customerSite.do?METHOD=E&LANGUAGE_ID=J&PRIORITY_CODE=4&SEMINAR_CODE=S15646

We invite you to actively collaborate in the Cisco Support Community and social media

https://supportforms.cisco.com

http://www.facebook.com/CiscoSupportCommunity

http://twitter.com/#!/cisco_support

http://www.youtube.com/user/ciscosupportchannel

http://itunes.apple.com/us/app/cisco-technical-support/id398104252?mt=8

http://www.linkedin.com/groups/CSC-Cisco-Support-Community-3210019

We have communities in other languages?

If you speak Polish, Japanese, or Spanish, we invite you to ask your questions and collaborate in your language.

- Spanish → https://supportforums.cisco.com/community/spanish

- Polish → https://supportforums.cisco.com/community/ etc/netpro-polska

- Japanese → https://supportforums.cisco.com/community/csc-japan

We're also running a pilot for Russian and Portuguese. You can register at the following links

- Russian:
https://www.ciscofeedback.vovici.com/se.ashx?s=6A5348A712220E19

- Portuguese: (Launching in January, 2012)
https://www.ciscofeedback.vovici.com/se.ashx?s=6A5348A77EE5C0B7

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- ## Supported Technologies

  - **Collaboration**
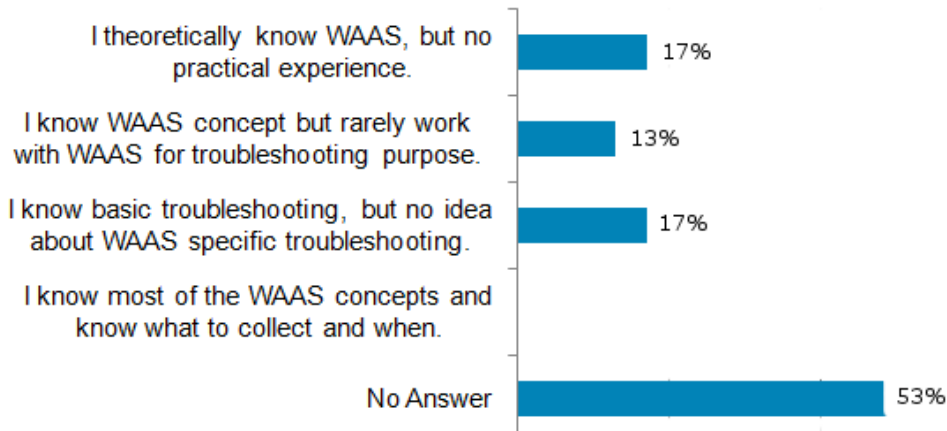
  - **Data Center / Virtualization**

  - **Emerging Technologies**

    - **Media Experience Engine (MXE)**

    - **Physical Security**

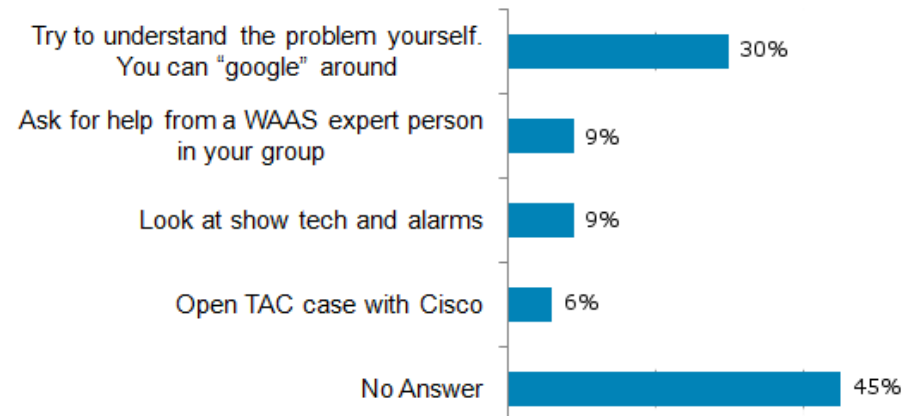   - **Smart Grid**

- ## To Open Cases & additional Information

  ## www.cisco.com/go/pdihelpdesk

Results of Polling Questions
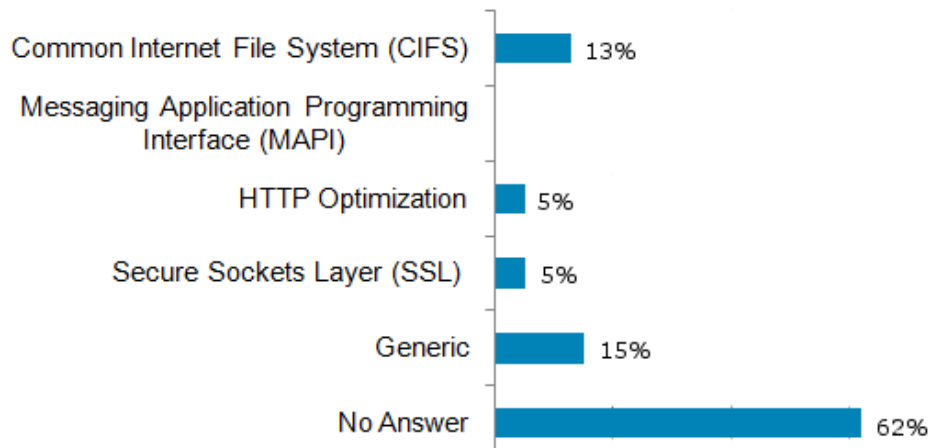
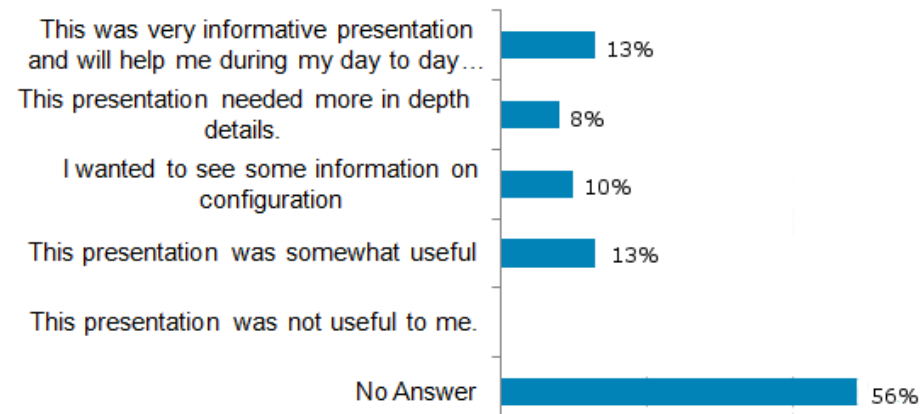## What is your level of experience in troubleshooting WAAS?

I theoretically know WAAS, but no practical experience.	17%
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I know basic troubleshooting, but no idea about WAAS specific troubleshooting.	17%
I know most of the WAAS concepts and know what to collect and when.	
No Answer	53%

What is the first thing you do when you encounter issues with WAAS?

Try to understand the problem yourself. You can "google" around	30%
Ask for help from a WAAS expert person in your group	9%
Look at show tech and alarms	9%
Open TAC case with Cisco	6%
No Answer	45%

Which Application Optimization (AO) do you encounter most issues with?

Common Internet File System (CIFS)	13%
Messaging Application Programming Interface (MAPI)	
HTTP Optimization	5%
Secure Sockets Layer (SSL)	5%
Generic	15%
No Answer	62%

How useful was this presentation?

This was very informative presentation and will help me during my day to day…	13%
This presentation needed more in depth details.	8%
I wanted to see some information on configuration	10%
This presentation was somewhat useful	13%
This presentation was not useful to me.	
No Answer	56%

Thank You for Your Time

Please Take a Moment to Complete the Evaluation