



Basic Mistakes by ISP's on Network setup & BGP

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ABOUT THE SPEAKER

- Shekhar Gupta, IsolNet Network Solution Pvt. Ltd., Chhattisgrah. India
- Electronic and Telecommunications Engineer
- 3 Years worked for Nokia & LG
- In networking field for 17 years.
- Certified from MikroTik (MTCNA)
- Running his own ISP in Chhattisgrah



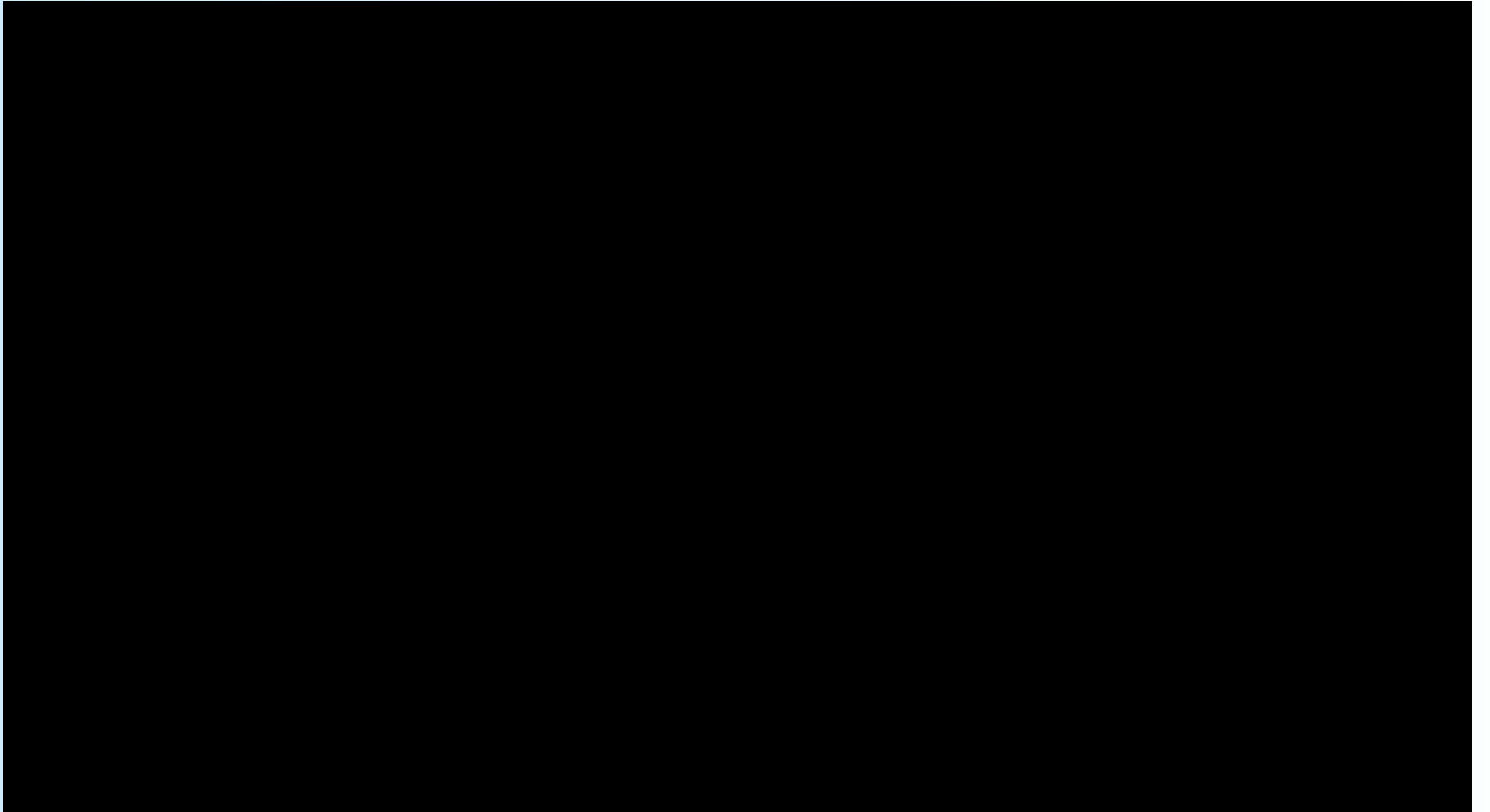
OBJECTIVES

- Startups need to be guided when venturing into ISP business.
- Our experience helps us guide entrepreneurs.
- QoS is a concern for ISP's



Before We Start

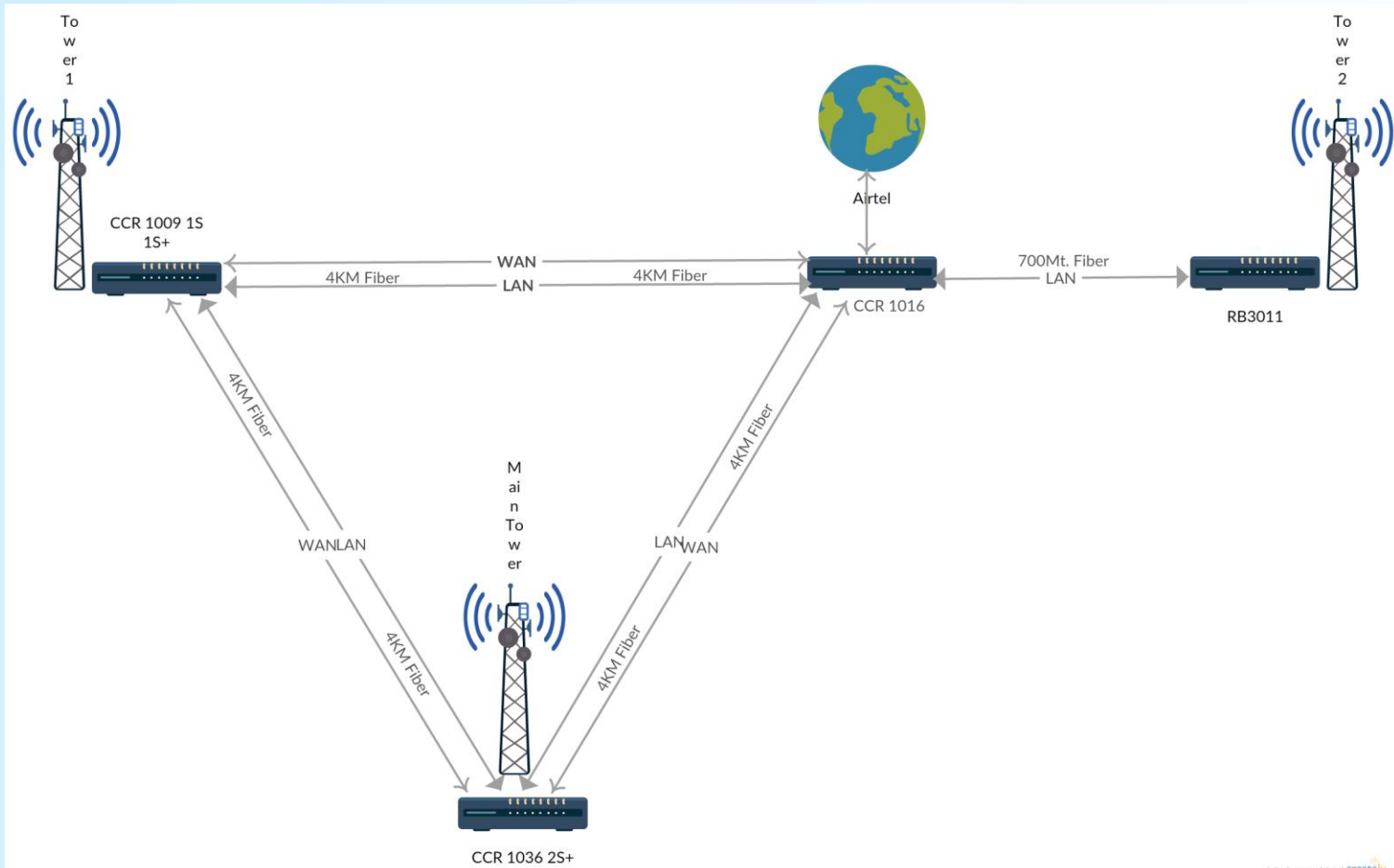
Clean India Green India



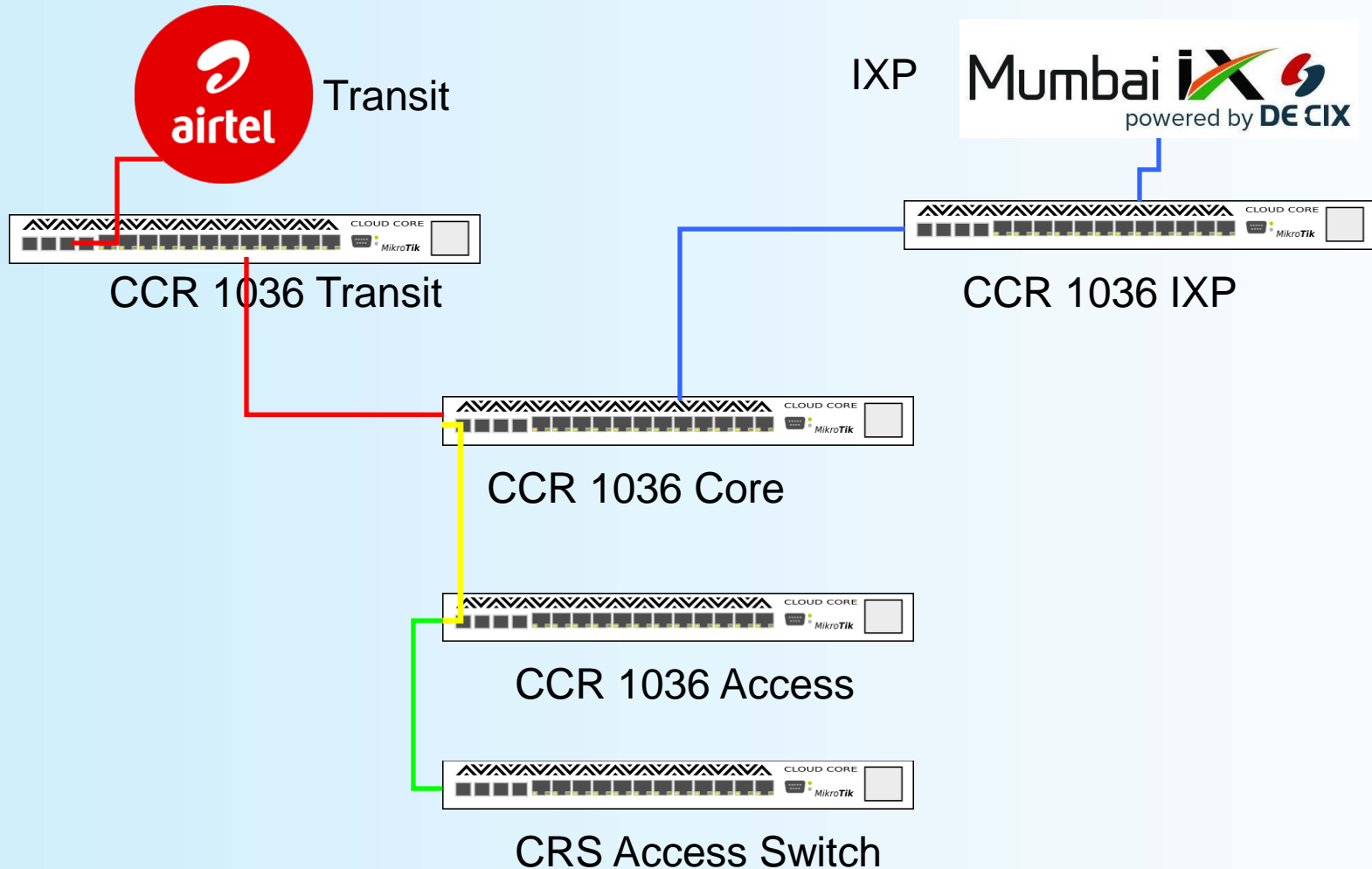
Reason to MikroTik

- Efficiency
- Performance
- Maintenance
- Cost
- Growth

Network Diagram



Physical Network Diagram



Physical Network Diagram

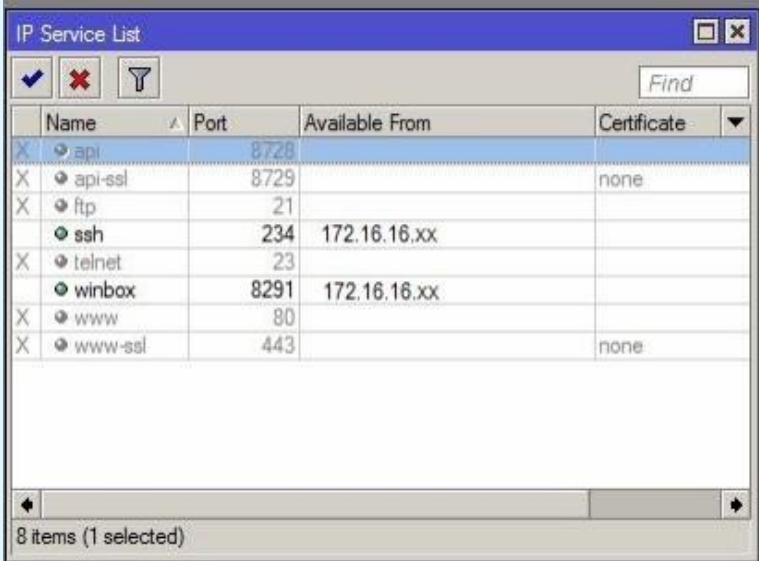


Don't forget!

- * **3 - Separate Earthing (Electrical Grounding)**
 - 1st for Lightning Arrester
 - 2nd for Tower
 - 3rd for Equipments
- * **They should not be inter-connected**
 - Each other Earth pit distance minimum 10 Meter
- * **Avoid Wireless devices back reflection.**
- * **Always Use Outdoor STP cable**

Don't forget! On ROS

- * Pre-config
- * Turn off unused service features
- * Web, telnet, ftp, etc
- * Change default port

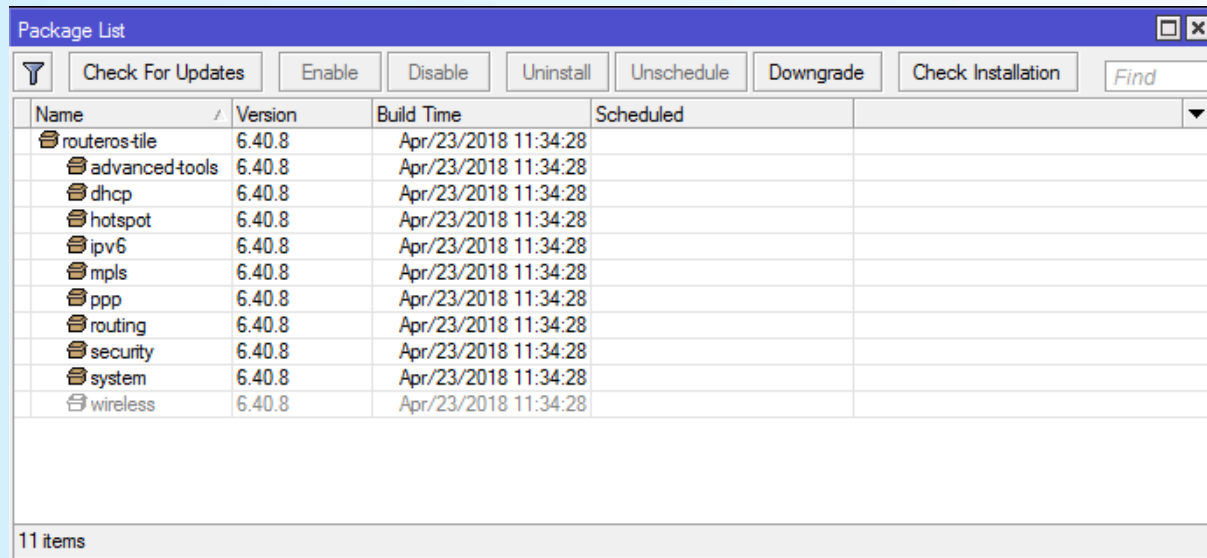


| Name | Port | Available From | Certificate |
|-----------|------|----------------|-------------|
| X api | 8728 | | |
| X api-ssl | 8729 | | none |
| X ftp | 21 | | |
| ssh | 234 | 172.16.16.xx | |
| X telnet | 23 | | |
| winbox | 8291 | 172.16.16.xx | |
| X www | 80 | | |
| X www-ssl | 443 | | none |

8 items (1 selected)

Turn off unused packages features

- Disable features/packages



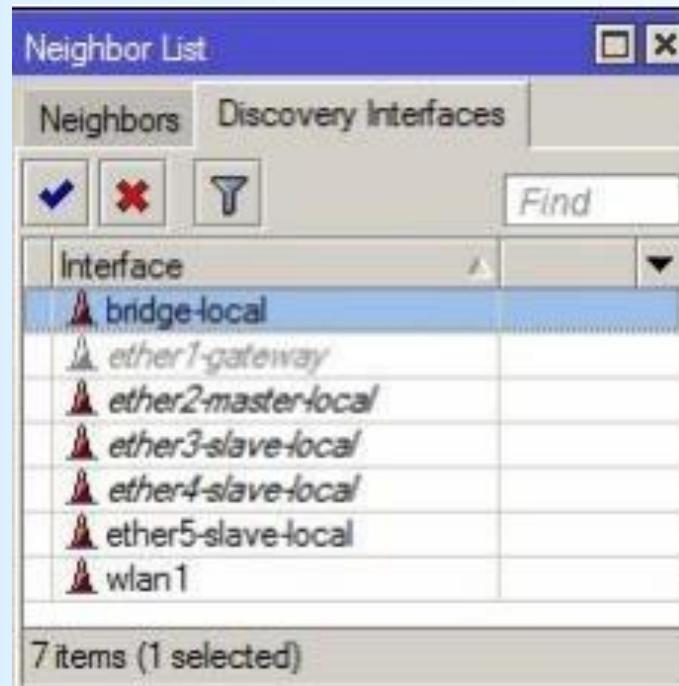
The screenshot shows a window titled "Package List" with a toolbar containing buttons for "Check For Updates", "Enable", "Disable", "Uninstall", "Unschedule", "Downgrade", "Check Installation", and a "Find" search box. Below the toolbar is a table with the following columns: Name, Version, Build Time, and Scheduled. The table lists 11 items, each with a folder icon and a list of features.

| Name | Version | Build Time | Scheduled |
|----------------|---------|----------------------|-----------|
| routeros-tile | 6.40.8 | Apr/23/2018 11:34:28 | |
| advanced-tools | 6.40.8 | Apr/23/2018 11:34:28 | |
| dhcp | 6.40.8 | Apr/23/2018 11:34:28 | |
| hotspot | 6.40.8 | Apr/23/2018 11:34:28 | |
| ipv6 | 6.40.8 | Apr/23/2018 11:34:28 | |
| mpls | 6.40.8 | Apr/23/2018 11:34:28 | |
| ppp | 6.40.8 | Apr/23/2018 11:34:28 | |
| routing | 6.40.8 | Apr/23/2018 11:34:28 | |
| security | 6.40.8 | Apr/23/2018 11:34:28 | |
| system | 6.40.8 | Apr/23/2018 11:34:28 | |
| wireless | 6.40.8 | Apr/23/2018 11:34:28 | |

11 items

Neighbour discovery

- Disable interface



Configuration

- User / Password
 - Proper credentials
- Latest stable OS
- Disable LCD / Minimal information
- Must use Vlan
- Implement a good firewall according to the article here ..
https://wiki.mikrotik.com/wiki/Manual:Securing_Your_Router



BGP

Always use Full Routing.

```
[NOC@IsoNet Core Router] > ip route print count-only
```

```
1427676
```

```
[NOC@IsoNet Core Router] > ip route print count-only where active=yes
```

```
517747
```



BGP

The way to influence BGP decision is by configuring routing filters.

Filtering **incoming** routes will change, how we see the external world, thus influencing how we **send** traffic;

Filtering **outgoing** routes will change how the world see us, thus influencing how we **receive** traffic.



BGP

Good practices for ingress filters for all peers are:

- Discard receiving own prefix;
- Discard default route (For Full Routing)

```
/ip firewall connection tracking> set enabled=no
```


BGP

How to check results?

- ❑ Tools that don't tell all the true:

Ping, traceroute, torch, bandwidth test...

- ❑ Where should we see:

Results of our upload policy: **Our routing table**

Results of our download policy: **Our routes as seen by other AS's (looking glasses)**

BGP

How to check results?

The screenshot displays a web browser window with the URL `https://www.hotstar.com/tv/yeh-rishta-kya-kehlata-hai/586/burglars-in-nairas-house/1000217015`. The page shows a video player for the episode "Burglars in Naira's House" from the series "Yeh Rishta Kya Kehlata Hai".

The Chrome DevTools Network tab is open, showing a list of requests. A context menu is open over the request `hsprepack.akamaized.net`. The table below shows the details of the requests:

| Name | Domain | Type | Size | Time | Waterfall |
|----------------------------------|-------------------------|------------|--------|--------|-----------|
| master_Layer9_00074.ts | hsprepack.akamaized.net | xhr | 630 B | 113 s | |
| v2?cf=short_form&dcid=d862490... | in-star.videoplaza.tv | text/plain | 187 B | 230 ms | |
| v2?aid=0&cf=short_form&cv=h5... | in-star.videoplaza.tv | text/plain | 128 B | 228 ms | |
| v2?aid=0&cf=short_form&cv=h5... | in-star.videoplaza.tv | text/plain | 128 B | 227 ms | |
| master_Layer9_00080.ts | hsprepack.akamaized.net | xhr | 2.3 MB | 113 s | |
| master_Layer9_00081.ts | hsprepack.akamaized.net | xhr | 2.2 MB | 188 s | |
| ?data=eyJldmVudC16ICJSZWJjaG... | api.mixpanel.com | xhr | 462 B | 877 ms | |
| t | api.segment.io | xhr | 141 B | 111 s | |
| master_Layer9_00082.ts | hsprepack.akamaized.net | xhr | 2.3 MB | 678 ms | |
| m | api.segment.io | xhr | 141 B | 353 ms | |
| master_Layer9_00083.ts | hsprepack.akamaized.net | xhr | 2.2 MB | 190 s | |
| master_Layer9_00084.ts | hsprepack.akamaized.net | xhr | 2.2 MB | 126 s | |
| master_Layer9_00085.ts | hsprepack.akamaized.net | xhr | 2.3 MB | 582 ms | |
| master_Layer9_00086.ts | hsprepack.akamaized.net | xhr | 2.2 MB | 749 ms | |
| master_Layer9_00087.ts | hsprepack.akamaized.net | xhr | 2.2 MB | 591 ms | |
| master_Layer9_00088.ts | hsprepack.akamaized.net | xhr | 2.3 MB | 635 ms | |
| master_Layer9_00089.ts | hsprepack.akamaized.net | xhr | 2.1 MB | 613 ms | |
| master_Layer9_00090.ts | hsprepack.akamaized.net | xhr | 2.3 MB | 589 ms | |
| master_Layer9_00091.ts | hsprepack.akamaized.net | xhr | 2.2 MB | 106 s | |
| master_Layer9_00092.ts | hsprepack.akamaized.net | xhr | 2.2 MB | 619 ms | |
| master_Layer9_00093.ts | hsprepack.akamaized.net | xhr | 2.2 MB | 613 ms | |
| master_Layer9_00094.ts | hsprepack.akamaized.net | xhr | 2.3 MB | 527 ms | |
| master_Layer9_00095.ts | hsprepack.akamaized.net | xhr | 2.2 MB | 598 ms | |
| master_Layer9_00096.ts | hsprepack.akamaized.net | xhr | 2.3 MB | 672 ms | |
| master_Layer9_00097.ts | hsprepack.akamaized.net | xhr | 2.2 MB | 161 s | |

The context menu options are: Open in new tab, Clear browser cache, Clear browser cookies, Copy, Block request URL, Block request domain, Replay XHR, Save as HAR with content, Copy (Ctrl+C).

Below the video player, the episode title "Burglars in Naira's House" is displayed, along with a "Like 68" button. The description reads: "Burglars sneak into Naira's house and hold Kartik and Naira hostage. Kirti is shocked as Swarna resolves to get Kartik and Aashi married."



BGP

How to check results?

Command Prompt

```
Microsoft Windows [Version 6.1.7601]  
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
```

```
C:\Users\Shekhar>tracert -d hsprepack.akamaized.net
```

```
Tracing route to a1205.dscw10.akamai.net [104.102.246.9]  
over a maximum of 30 hops:
```

| | | | | |
|---|-------|-------|-------|----------------|
| 1 | <1 ms | <1 ms | <1 ms | 192.168.1.1 |
| 2 | 2 ms | 1 ms | 1 ms | 103.91.97.1 |
| 3 | 2 ms | 2 ms | 1 ms | 103.91.96.13 |
| 4 | 34 ms | * | 34 ms | 103.27.170.104 |
| 5 | 33 ms | 32 ms | 33 ms | 104.102.246.9 |

```
Trace complete.
```

```
C:\Users\Shekhar>
```



Problem

Some websites not opening and some

websites very slow ?

User is PPPoE mode



Solution

MTU and TCP-MSS



MTU and TCP-MSS

Overview

MTU

This is the maximum packet size that can be sent over the interface. Different types of interfaces will have different MTU's depending on the overheads of the interface.

Ethernet = 1500

PPPoE = 1492



MTU and TCP-MSS

Overview

MSS

This is the maximum segment size of a TCP packet.

Remember that a TCP packet consists of the Segment + TCP header (20 bytes)
+ IP header (20 bytes)

For the TCP packet to be sent over the router interface without being fragmented
it will need to not be bigger than the interface MTU.

We can therefore conclude that the MSS is the MTU - 40 bytes



MTU and TCP-MSS

Overview

TCP-MSS

This is where the segment size is set between two devices communicating with TCP

The MSS is sent in the SYN packet of the TCP 3-way handshake and should be accepted and used by the other party. This is not a negotiation and both sides will send their MSS in their SYN to the other side.

On any router you should be able to look into the SYN packet of the 3-way handshake and identify the MSS. If the MSS is too high for the interface the packet is being sent over, then the router should change this to a suitable value.



MTU and TCP-MSS

Configuration

On a Mikrotik router the TCP-MSS gets picked up and set in a mangle rule. For this example we will set the MSS for traffic going over the PPPoE interface. We will set the MSS at 1452 which is calculated as per below:

MSS = MTU of interface - TCP Header - IP Header

MSS = 1492 - 20 - 20

MSS = 1452

The mangle rule will catch the TCP SYN for both upload and download traffic and will replace the MSS with 1452 only if a higher value has been set

/ip firewall mangle

```
add action=change-mss chain=forward new-mss=1452 out-interface=pppoe-out1  
passthrough=yes protocol=tcp tcp-flags=syn tcp-mss=1453-65535
```

```
add action=change-mss chain=forward in-interface=pppoe-out1 new-mss=1452  
passthrough=yes protocol=tcp tcp-flags=syn tcp-mss=1453-65535
```



Q/A



Thank You

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