



# Basic Mistakes by ISP's on Network setup & BGP

**Presented by Shekhar Gupta  
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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



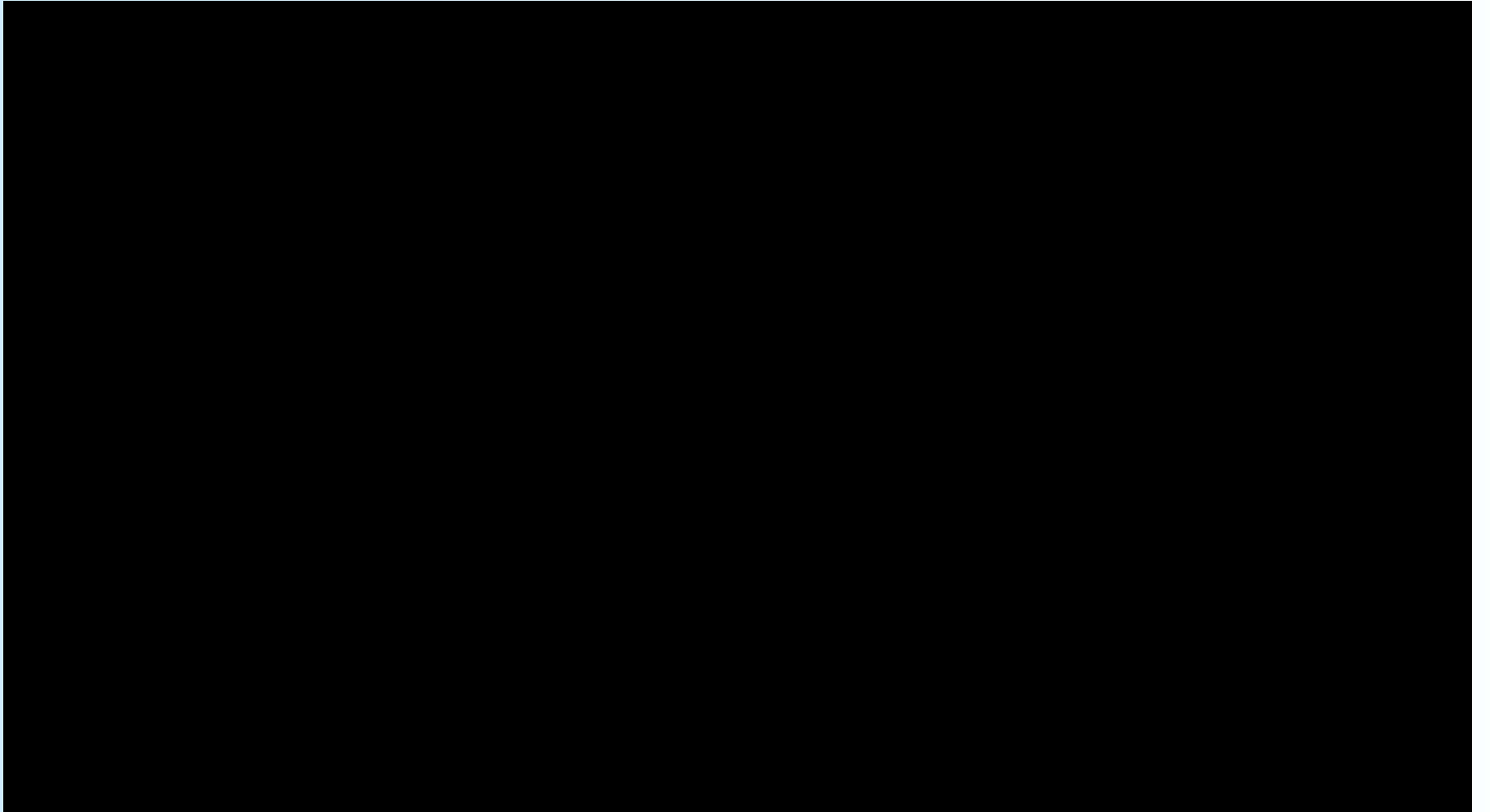
# OBJECTIVES

- 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

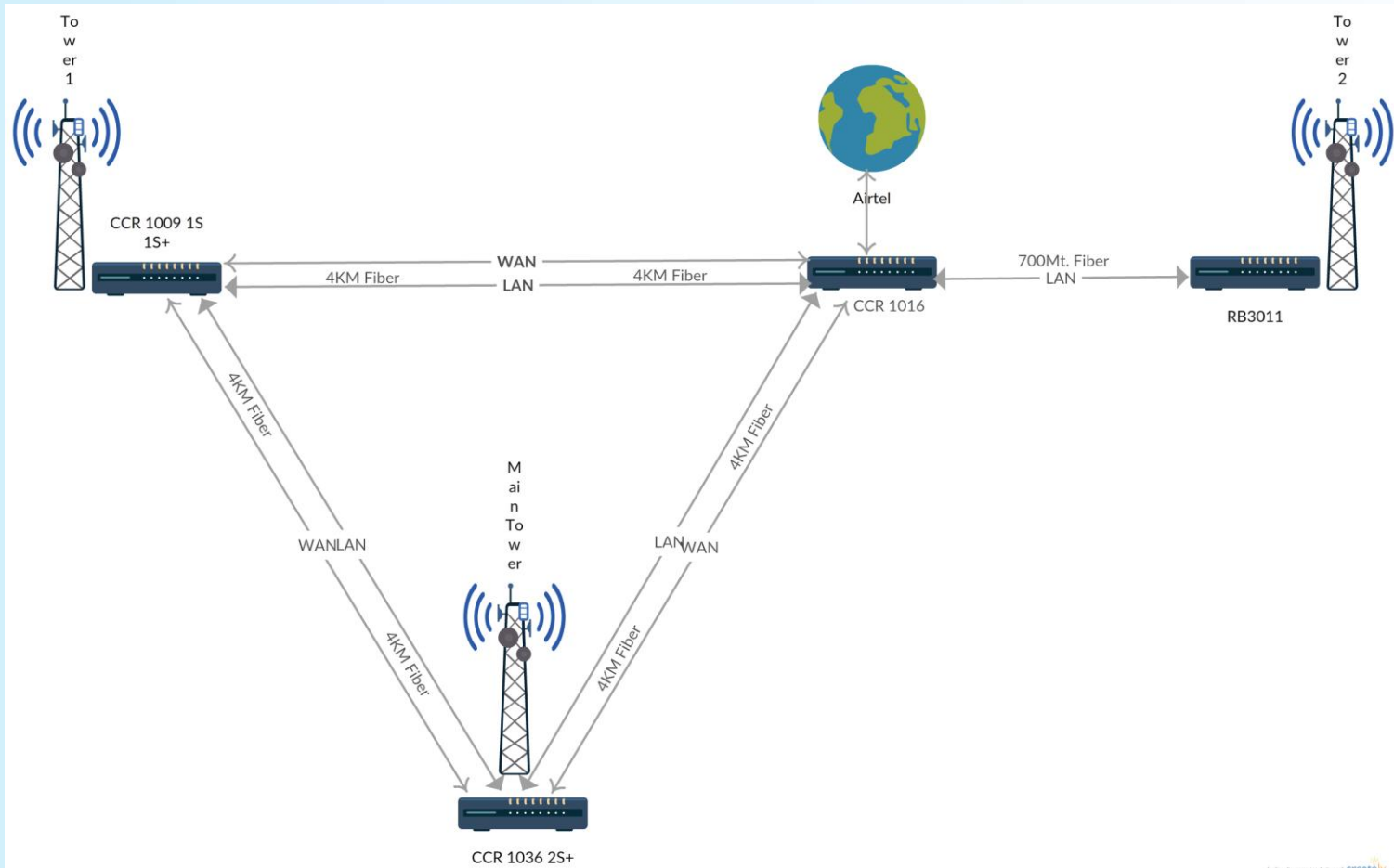
## Clean India Green India



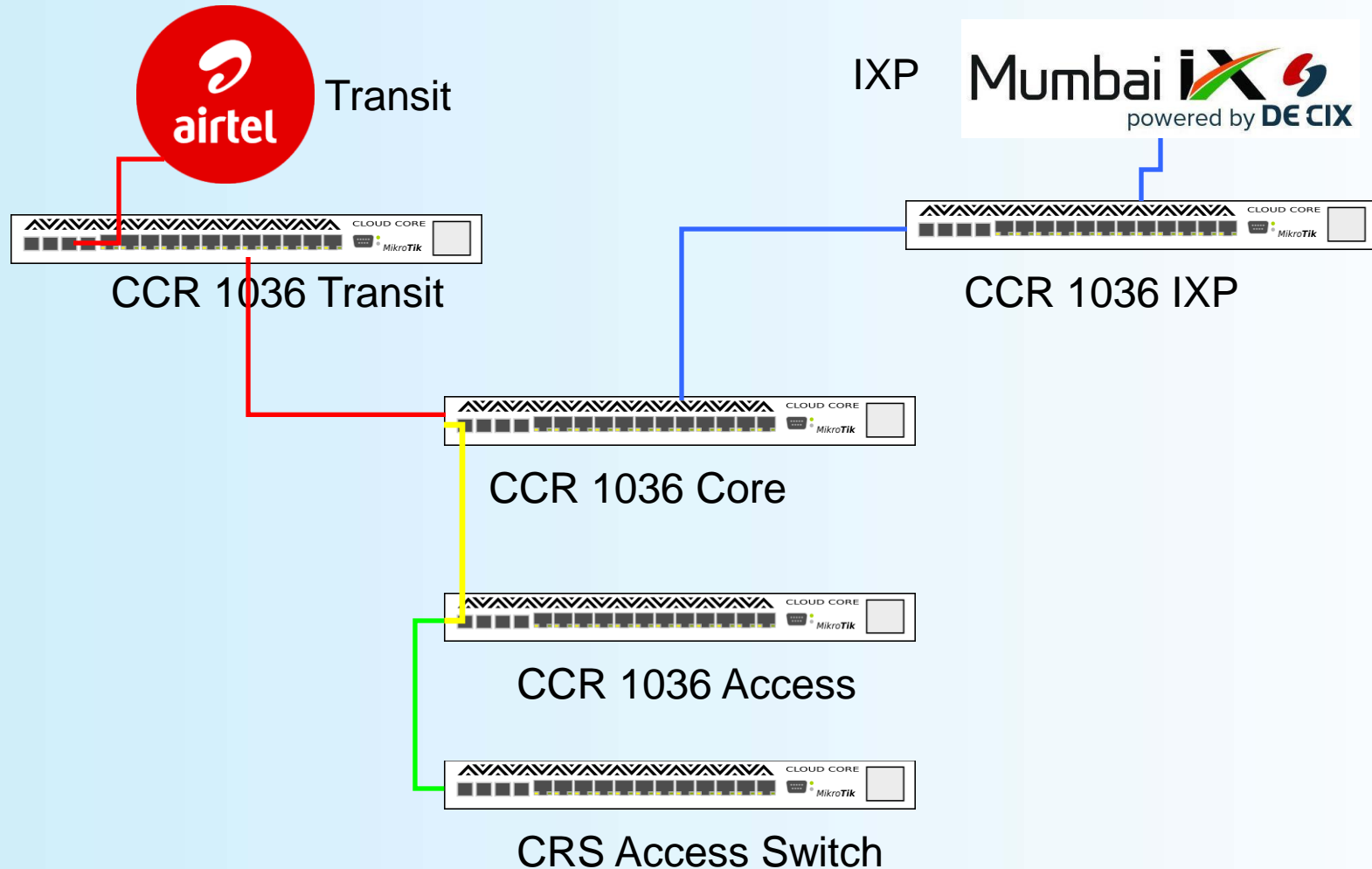
# Reason to MikroTik

- Efficiency
- Performance
- Maintenance
- Cost
- Growth

# Network Diagram



# Physical Network Diagram



# Physical Network Diagram






# Don't forget!

- \* **3 - Separate Earthing (Electrical Grounding)**
  - 1<sup>st</sup> for Lightning Arrester
  - 2<sup>nd</sup> for Tower
  - 3<sup>rd</sup> 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

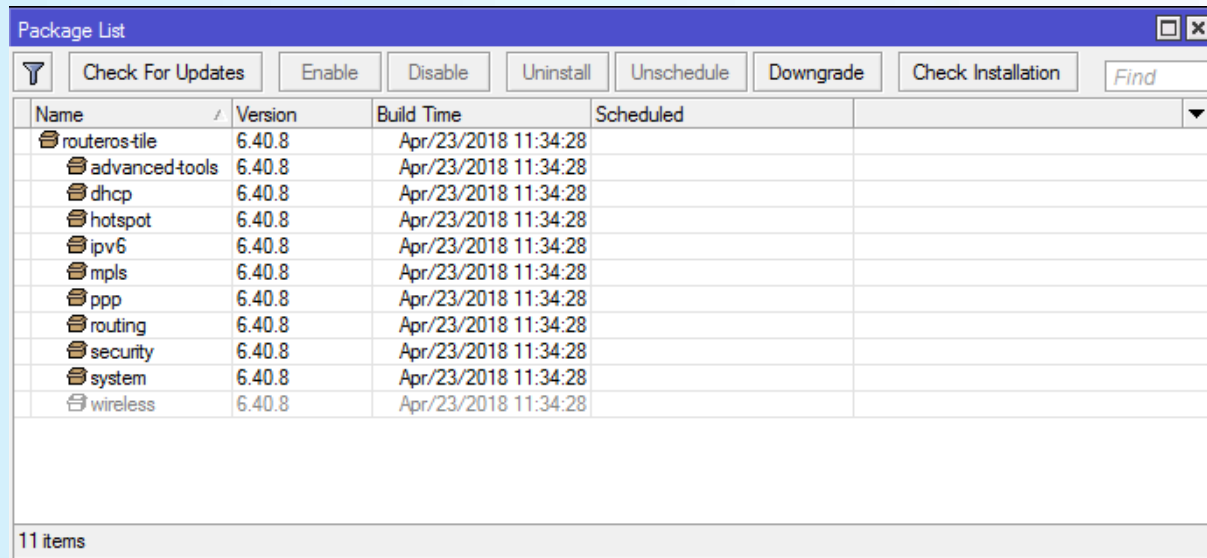


Name	Port	Available From	Certificate
X api	8728		
X api-ssl	8729		none
X ftp	21		
ssh	234	172.16.16.xx	
X telnet	23		
winbox	8291	172.16.16.xx	
X www	80		
X www-ssl	443		none

8 items (1 selected)

# Turn off unused packages features

- Disable features/packages



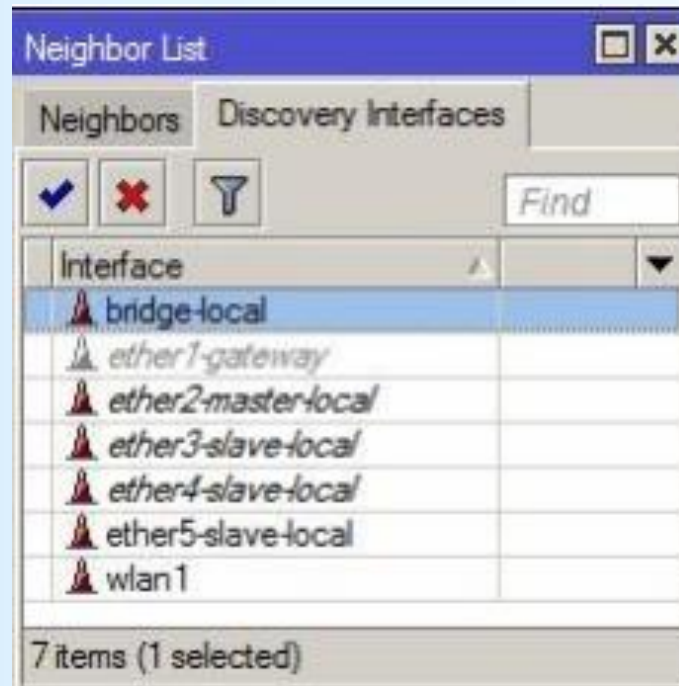
The screenshot shows a window titled "Package List" with a toolbar containing buttons for "Check For Updates", "Enable", "Disable", "Uninstall", "Unschedule", "Downgrade", "Check Installation", and a "Find" search box. Below the toolbar is a table with the following columns: Name, Version, Build Time, 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](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...

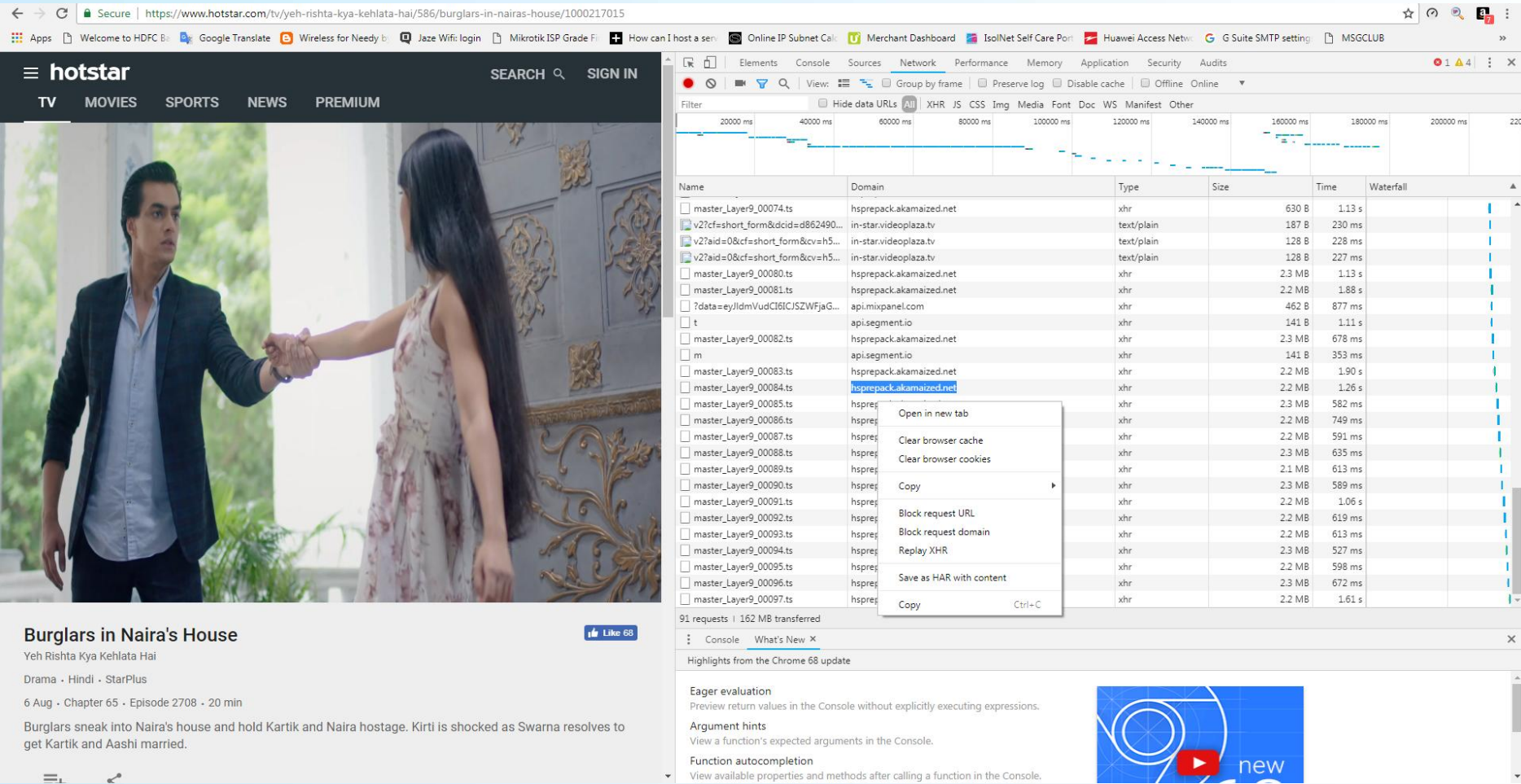
- ❑ Where should we see:

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 entry for `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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