TWNOG Workshop

IP Routing TroubleShooting—OSPF、BGP

2010/7/2

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Agenda

- Troubleshooting tools
  - *show* commands
  - *debug* output
  - *log* messages
  - *traceroute* and *ping*
- 常見路由狀況處理
- 進階路由狀況處理
- Troubleshooting Exercises

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show Commands (1/3)

```
router#show ip ospf ?
  <1-65535>              Process ID number
  border-routers         Border and Boundary Router Information
  database               Database summary
  flood-list             Link state flood list
  interface              Interface information
  mpls                   MPLS related information
  neighbor               Neighbor list
  request-list           Link state request list
  retransmission-list    Link state retransmission list
  sham-links             Sham link information
  statistics             Various OSPF Statistics
  summary-address        Summary-address redistribution Information
  timers                 OSPF timers information
  virtual-links          Virtual link information
  |                      Output modifiers
  <cr>
```

show Commands (2/3)

```
router#show ip bgp ?
 A.B.C.D          IP prefix <network>/<length>, e.g., 35.0.0.0/8
 A.B.C.D          Network in the BGP routing table to display
 cidr-only        Display only routes with non-natural netmasks
 community        Display routes matching the communities
 community-list   Display routes matching the community-list
 dampened-paths   Display paths suppressed due to dampening
 filter-list      Display routes conforming to the filter-list
 flap-statistics  Display flap statistics of routes
 inconsistent-as  Display only routes with inconsistent origin Ass
 neighbors        Detailed information on TCP and BGP neighbor connections
 paths            Path information
 peer-group       Display information on peer-groups
 quote-regexp     Display routes matching the AS path "regular expression"
 regexp           Display routes matching the AS path regular expression
 summary          Summary of BGP neighbor status
 | Output modifiers
 <cr>
```


show Commands (3/3)

```
router#show ip bgp neighbors x.x.x.x ?
 advertised-routes   Display the routes advertised to a BGP neighbor
 dampened-routes     Display the dampened routes received from neighbor
 flap-statistics     Display flap statistics of the routes learned from neighbor
 paths               Display AS paths learned from neighbor
 received            Display information received from a BGP neighbor
 received-routes     Display the received routes from neighbor
 routes              Display routes learned from neighbor
 | Output modifiers
 <cr>
```

debug Command (1/3)

- router#debug ip ospf ?

```
  adj            OSPF adjacency events
  database-timer OSPF database timer
  events         OSPF events
  flood          OSPF flooding
  hello          OSPF hello events
  lsa-generation OSPF lsa generation
  mpls           OSPF MPLS
  nsf            OSPF non-stop forwarding events
  packet         OSPF packets
  retransmission OSPF retransmission events
  spf            OSPF spf
  tree           OSPF database tree
```

debug Command (2/3)

- router#debug ip bgp ?

```
  A.B.C.D    BGP neighbor address
  dampening  BGP dampening
  events     BGP events
  keepalives BGP keepalives
  updates    BGP updates
  <cr>
```

debug Command (3/3)

- router#debug ip bgp updates ?
  <1-199> Access list
  <1300-2699> Access list (expanded range)
  <cr>
- router#debug ip bgp x.x.x.x updates ?
  <1-199> Access list
  <1300-2699> Access list (expanded range)
  <cr>
- Use an access-list to limit the output!

log Messages

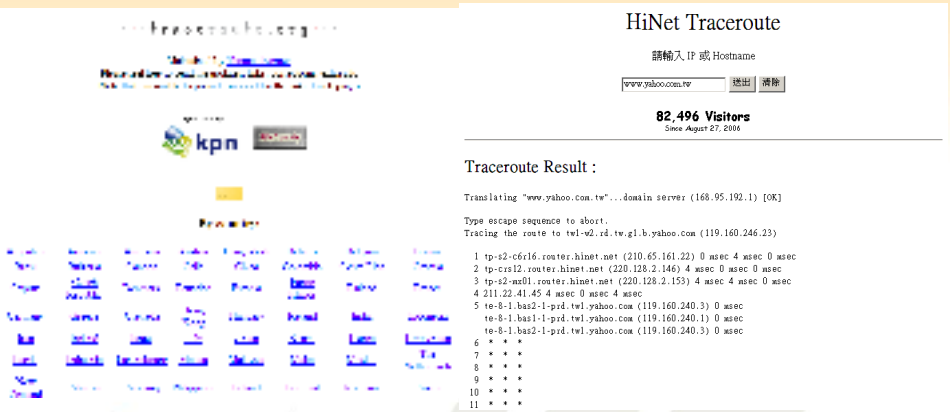
- OSPF
  - log-adjacency-changes
  - Process 100, Nbr x.x.x.x on GigabitEthernetx/x from FULL to DOWN, Neighbor Down: Interface down or detached
- BGP
  - bgp log-neighbor-changes
  - %BGP-5-ADJCHANGE: neighbor x.x.x.x Up
  - %BGP-5-ADJCHANGE: neighbor x.x.x.x Down-Remote AS changed

ping

- Repeat count
- Datagram size
- Source address or interface
- round-trip min/avg/max

traceroute

- http://www.traceroute.org/
- http://traceroute.hinet.net/



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常見路由狀況處理 (1/5)

- OSPF Neighbor state stuck!
  - Init state
    - Link problem
    - Input Access list deny ip 224.0.0.5
      (OSPF hello packets destination)
  - Two-Way state
    - Priority of all interfaces set to 0
    - Normal if have full adjacency with DR and BDR
  - Exstart/Exchange state
    - MTU mismatch
    - Authentication key mismatch

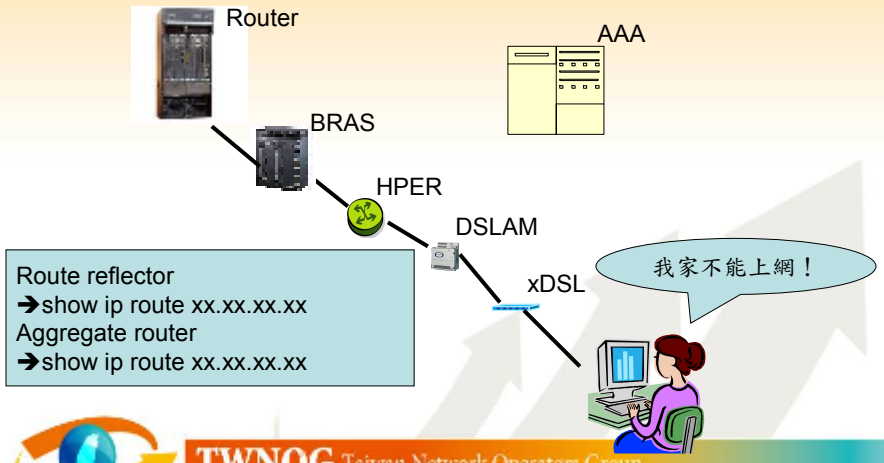
常見路由狀況處理 (2/5)

- BGP Neighbor state stuck!
  - Routers establish TCP session on port 179
    - Permit in ACLs
  - IP connectivity
    - Route from IGPs
  - Incorrect configuration
    - Local AS、remote-as
    - Update-source interface mismatch
    - eBGP peer multihop count
    - Password mismatch

常見路由狀況處理 (2/5)

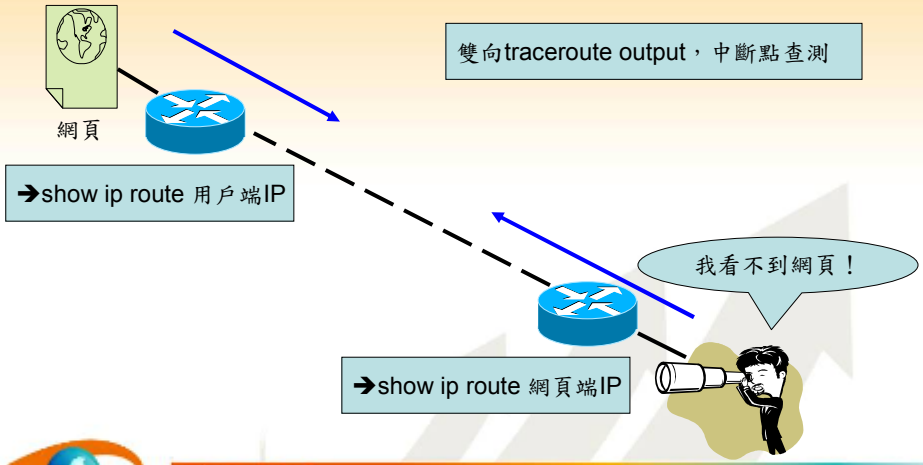
查明原因
➔show ip bgp neighbors x.x.x.x | include Last reset
確認路由狀態
➔show ip bgp neighbors x.x.x.x flap-statistics
➔show ip bgp neighbors x.x.x.x dampened-routes
確認路由筆數及限制
➔show ip bgp neighbors x.x.x.x policy
➔show ip bgp summary

常見路由狀況處理 (3/5)



Route reflector
➔show ip route xx.xx.xx.xx
Aggregate router
➔show ip route xx.xx.xx.xx

常見路由狀況處理 (4/5)



常見路由狀況處理 (5/5)

送出的routes（未經用戶ACL過濾）
➔show ip bgp neighbors x.x.x.x advertised-routes
收到的routes（未經router本身ACL過濾）
➔show ip bgp neighbors x.x.x.x received-routes
收到的routes（經router本身ACL過濾後）
➔show ip route x.x.x.x

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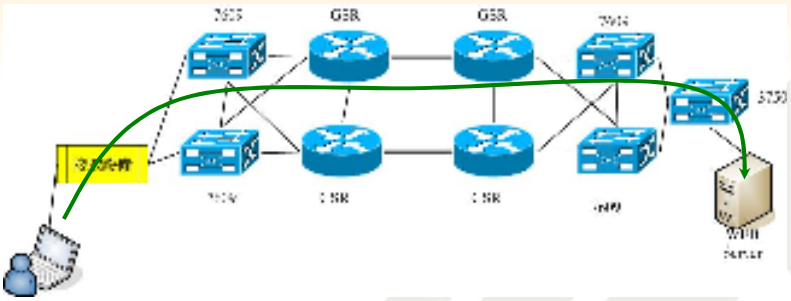
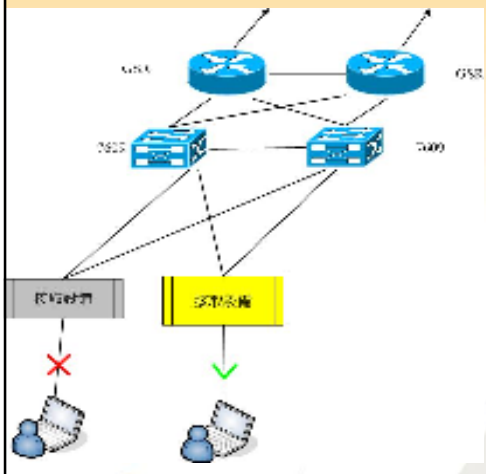
進階路由狀況處理 Case 1 (1/5)

- 某機房少數用戶反應連線到某幾個特定網站連線異常，網頁無法開啟或是開啟速度相當緩慢。
- 用戶traceroute至網站均正常。
- 因無大量及明確之障礙訊息，無法直接判斷出問題之節點。

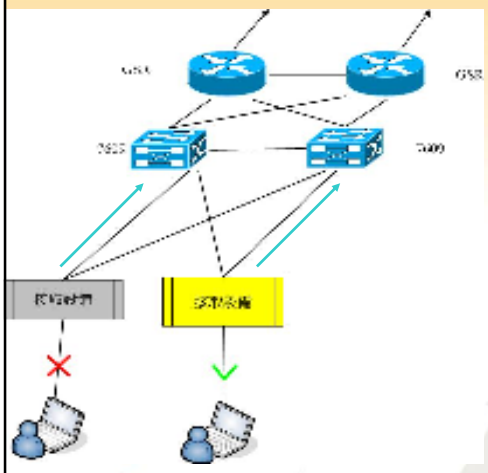


進階路由狀況處理 Case 1 (2/5)



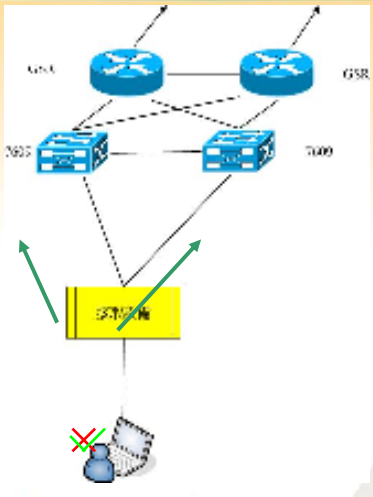
- 某用戶有申請多條電路，部份電路有障礙，其他則無。
- 檢查用戶至網站路徑上所有設備之路由，確認均有用戶及網站的正確路由。

進階路由狀況處理 Case 1 (3/5)



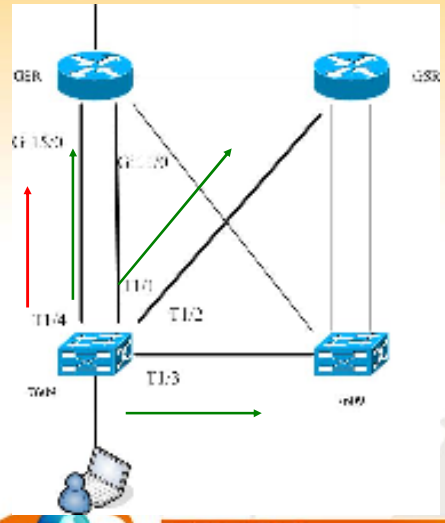
- 將測試筆電接在不同接取設備下，可以複製出用戶所發生之障礙。
- 對照結果，發生障礙接取設備之default route均指向一台Cisco 7609，反之則無障礙發生。

進階路由狀況處理 Case 1 (4/5)



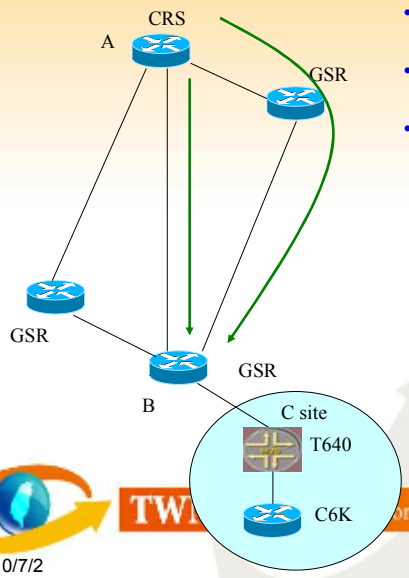
- 調整接取設備之default route，只要指向原本正常之7609，就可以將此障礙排除，因此懷疑是7609之設備障礙。
- 檢查懷疑障礙之7609後無法找出異常狀態，只好將該設備reload，但是reload後障礙仍持續。

進階路由狀況處理 Case 1 (5/5)



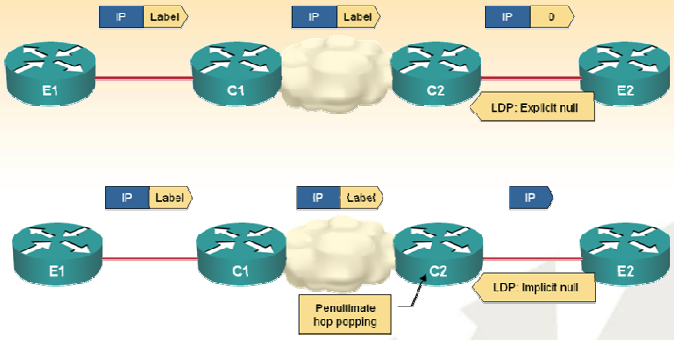
- 將測試筆電接往疑似障礙之7609，將無法開啟網站的網段以static route的方式，輪流指向四個連外的介面上。
- 發現指向其中一個介面時會發生障礙。
- 判斷為GSR障礙，將設備reload完後，障礙排除。

進階路由狀況處理 Case 2 (1/2)



- 為分散A、B兩點間訊務，設定多路MPLS TE。
- 設定MPLS TE後，隨即有部份C site用戶反應連線異常。
- 將MPLS TE移除後及恢復正常。

進階路由狀況處理 Case 2 (2/2)



- 經Cisco TAC解釋，IOS定義Label = 0為implicit-null，而IOS-XR則按照MPLS標準則定義Lable = 0為explicit-null，Label = 3為implicit-null。

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Troubleshooting Exercise (1/4)

- mis-operation: copy, modified, and paste
  Add a new route

COPY

```
router bgp 65001
 network 220.1.1.0 route-map ADSL
exit
ip route 220.1.1.0 255.255.255.0 168.95.156.1
```

PASTE

```
router bgp 65001
 network 61.2.2.0 route-map ADSL
exit
ip route 61.2.2.0 255.255.255.0 168.95.156.1
```

Troubleshooting Exercise (2/4)

- mis-operation: copy, modified, and paste
  Delete an old route

COPY

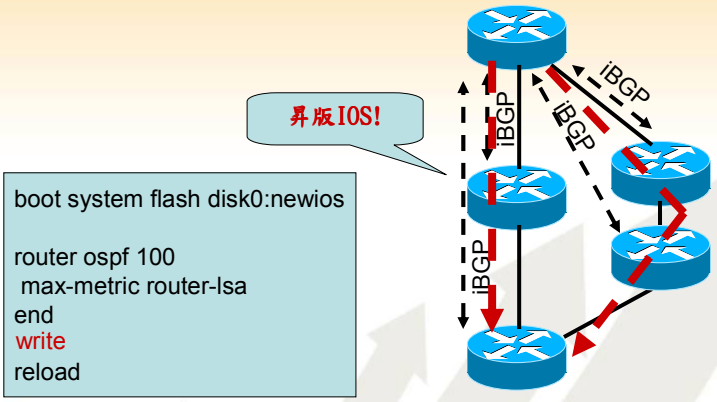
```
router bgp 65001
 network 220.1.1.0 route-map ADSL
exit
ip route 220.1.1.0 255.255.255.0 168.95.156.1
```

PASTE

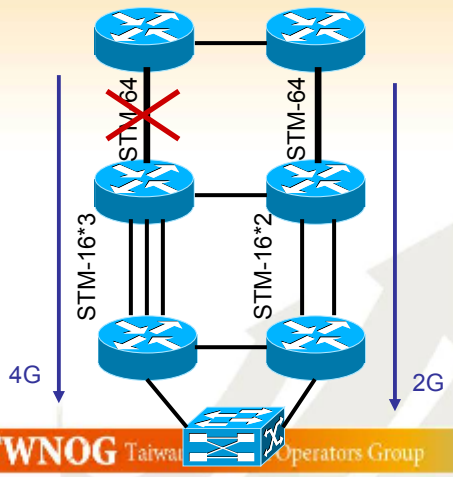
```
no router bgp 65001
 no network 220.1.1.0 route-map ADSL
exit
no ip route 220.1.1.0 255.255.255.0 168.95.156.1
```

Troubleshooting Exercise (3/4)

- mis-operation:
  Reload a router



Troubleshooting Exercise (4/4)



References

- **Troubleshooting BGP in Large IP Networks, Session 2210, Cisco Systems.**
- **HiNet骨幹網路障礙處理紀錄**