

ADD-PATHの 基本的な設定例と検討課題

インターネットマルチフィード(株) 技術部

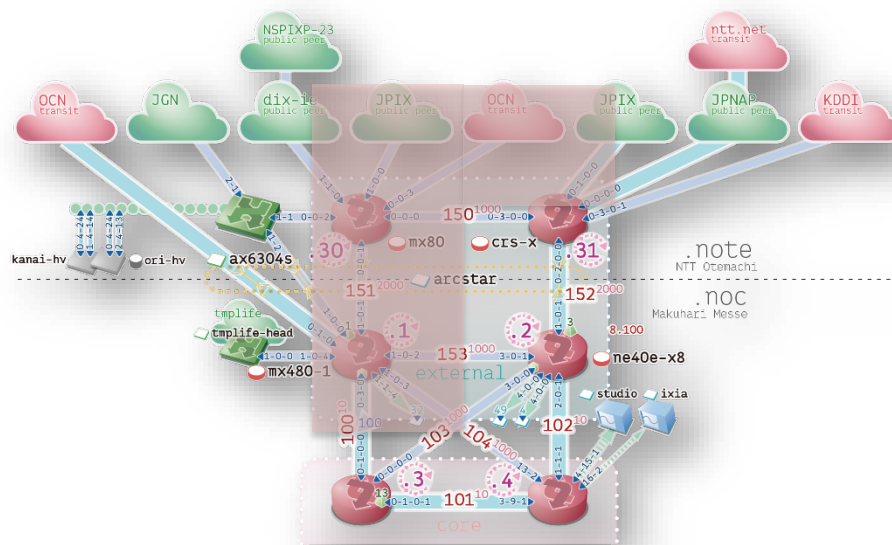
Interop tokyo 2013 NOC

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Interop Tokyo 2013 と ADD-PATH

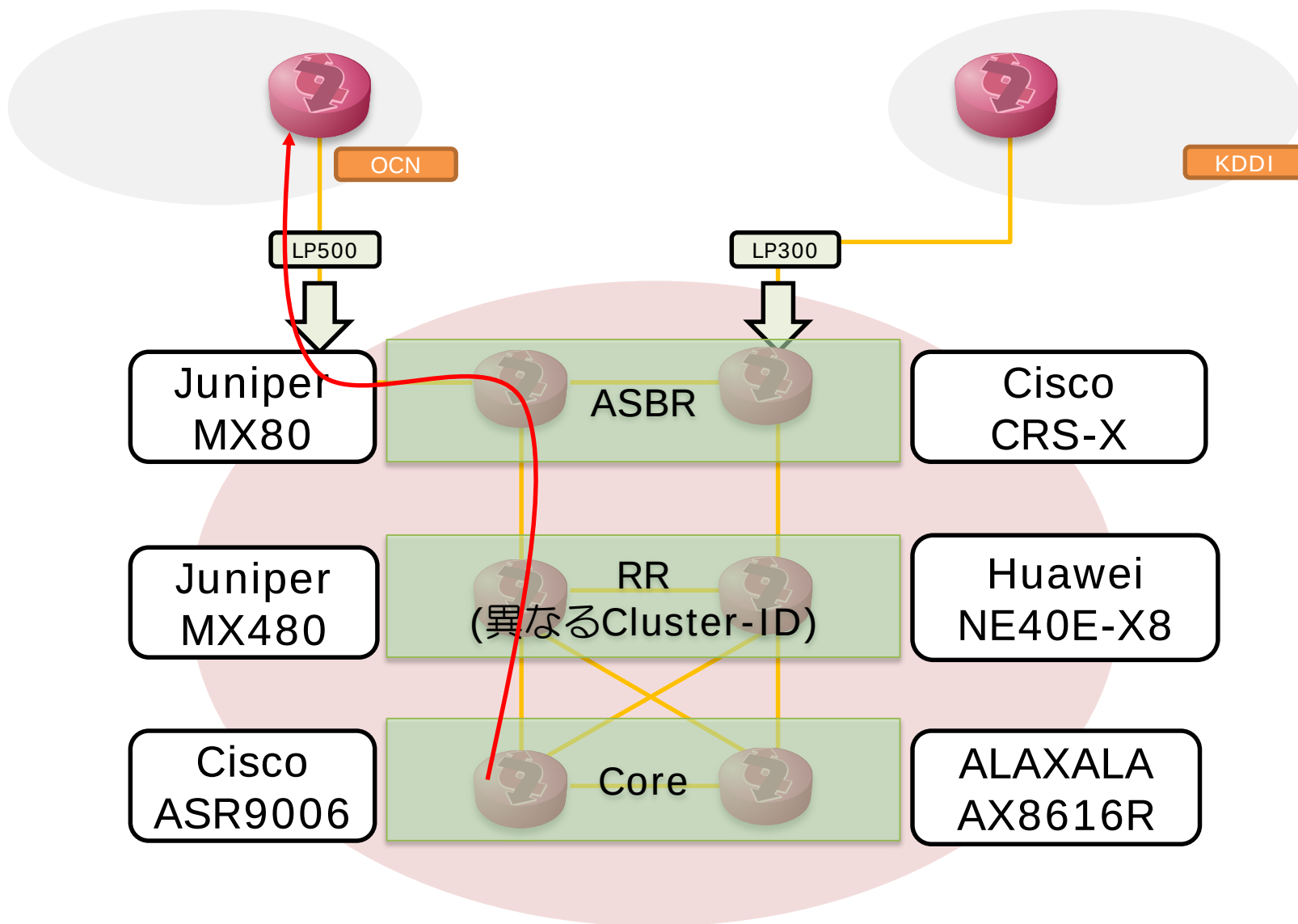
- 今年度のInterop Tokyo 2013では
ADD-PATHの相互接続検証を行いました
 - MX80, MX480, CRS-X, ASR9006
 - NE40E-X8, AX8016R



- ねらい
 - 相互接続 (Cisco <-> Juniper)
 - ADD-PATH Capability の切替が上手くいくか
 - 収束時間が短くなるか (フルルートで試す)

対外が切れた時の復旧時間を早くできたらうれしい！

- 今日は以下の点を話します
 - 各機器の「基本的な設定」と「見え方」
 - 今回の問題点、ADD-PATH の課題



ADD-PATH設定

凡例:

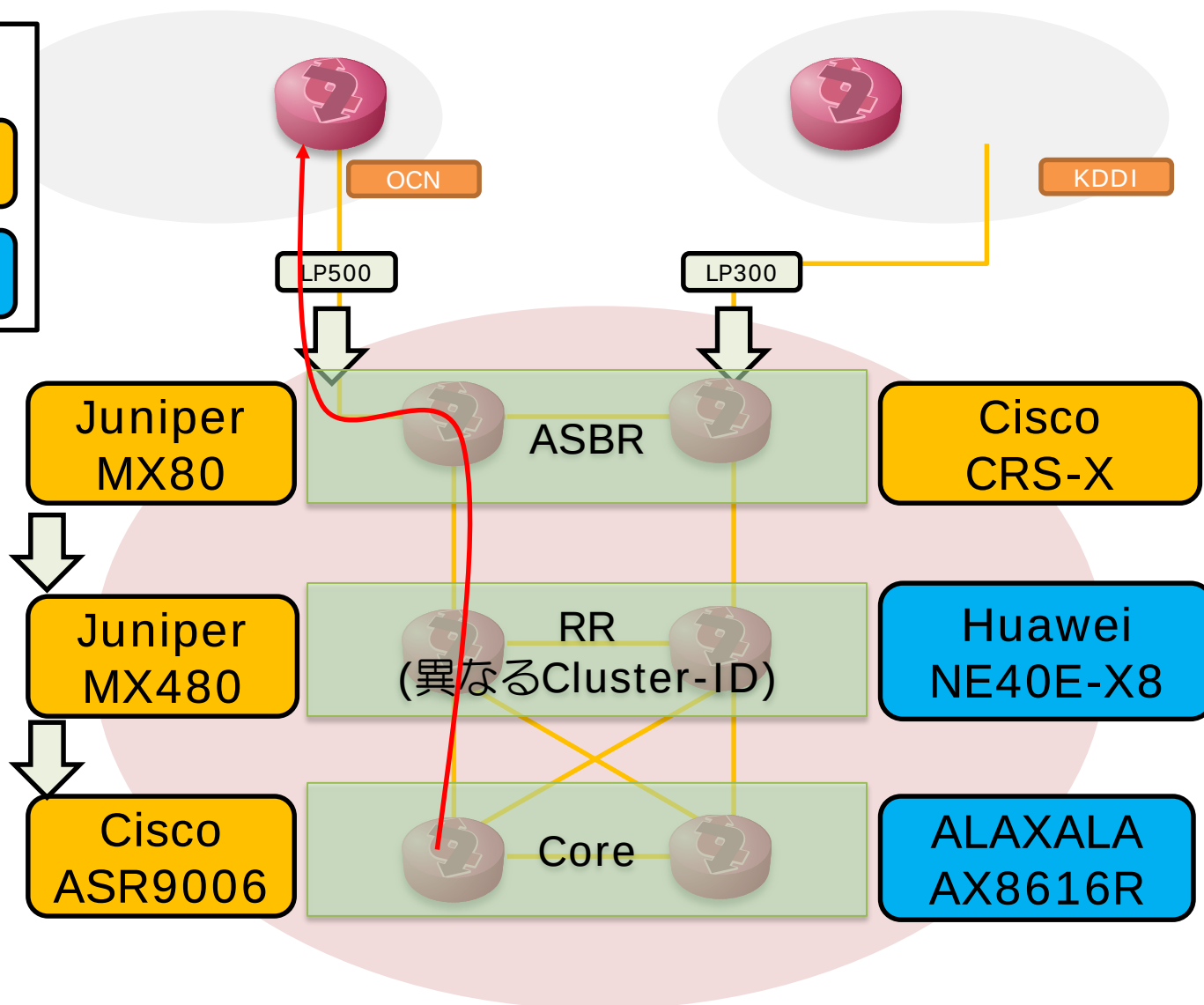
ADD-PATH有効

ADD-PATH無効

RRにsend
RRからrecv

ASBRからrecv
Coreにsend

RRからrecv



- Juniper

例: AF全体でenable(groupやneighborでも可能)

```
set protocols bgp family inet  
unicast add-path <send n/recv>
```

- Cisco(IOS XR)

方法1: AF全体でenable

```
(config)# router bgp 131154  
(config-bgp)# address-family ipv4 unicast  
(config-bgp-af)# additional-paths <send/receive>
```

方法2: neighbor毎

```
(config)#router bgp 131154  
(config-bgp)#neighbor x.x.x.x  
(config-bgp-nbr)#capability additional-paths <send/receive>
```

⇒ **BGPのCapability**なので**peer**の張り直して反映



Cisco: capabilityの確認(v4)

```
# show bgp ipv4 unicast neighbors <neighbor addr>
```

対向がADD-PATH をSEND/RECVしている場合

```
BGP neighbor is 45.0.0.1  
Remote AS 131154, local AS 131154, internal link  
Description: mx480-1.noc  
Remote router ID 45.0.0.1  
For Address Family: IPv4 Unicast
```

AF-dependent capabilities:

Additional-paths Send: advertised and received

Additional-paths Receive: advertised and received

対向がADD-PATH をSENDのみしている場合

```
RP/0/RP0/CPU0:crs-x.note#show bgp neighbor 45.0.0.30  
BGP neighbor is 45.0.0.30  
Remote AS 131154, local AS 131154, internal link  
Description: mx80.note  
Remote router ID 45.0.0.30  
For Address Family: IPv4 Unicast
```

AF-dependent capabilities:

Additional-paths Send: advertised and received

Additional-paths Receive: advertised

...

Additional-paths operation: Receive



Cisco: capabilityの確認(v6)

show bgp ipv6 unicast neighbors <neighbor addr>

対向がADD-PATH をSEND/RECVしている場合

BGP neighbor is 2001:3e8::1
Remote AS 131154, local AS 131154, internal link
Description: mx480-1.noc
Remote router ID 45.0.0.1
For Address Family: IPv6 Unicast

AF-dependent capabilities:

Additional-paths Send: advertised and received

Additional-paths Receive: advertised and received

対向がADD-PATH を無効にしている場合

BGP neighbor is 2001:3e8::2
Remote AS 131154, local AS 131154, internal link
Description: ne40e-x8
Remote router ID 45.0.0.2
For Address Family: IPv6 Unicast

AF-dependent capabilities:

Additional-paths Send: advertised

Additional-paths Receive: advertised

```
mx80.note> show bgp neighbor 45.0.0.31
```

対向がADD-PATH をSEND/RECVしている場合

```
Peer: 45.0.0.31+19246 AS 131154 Local: 45.0.0.30+179 AS 131154  
Type: Internal State: Established Flags: <Sync>  
NLRI for restart configured on peer: inet-unicast  
NLRI advertised by peer: inet-unicast  
NLRI for this session: inet-unicast  
Peer supports Refresh capability (2)  
Stale routes from peer are kept for: 300  
Peer does not support Restarter functionality  
Peer does not support Receiver functionality  
Peer supports 4 byte AS extension (peer-as 131154)
```

NLRI's for which peer can send and receive multiple paths: inet-unicast

対向がADD-PATH を無効にしている場合

```
Peer: 45.0.0.31+24070 AS 131154 Local: 45.0.0.30+179 AS 131154  
Type: Internal State: Established Flags: <Sync>  
NLRI for restart configured on peer: inet-unicast  
NLRI advertised by peer: inet-unicast  
NLRI for this session: inet-unicast  
Peer supports Refresh capability (2)  
Stale routes from peer are kept for: 300  
Peer does not support Restarter functionality  
Peer does not support Receiver functionality  
Peer supports 4 byte AS extension (peer-as 131154)
```

Peer does not support Addpath



Cisco: PATH確認方法

```
crs-x.note#show bgp 203.178.143.143
```

BGP routing table entry for 203.178.128.0/17

Paths: (2 available, best #1)

Path #1: Received by speaker 0

Not advertised to any peer

4713 2500, (aggregated by 2500 -), (received & used)

45.0.0.1 (metric 1011) from 45.0.0.1 (45.0.0.1)

Origin IGP, metric 0, localpref 600, valid, internal, atomic-aggregate, best, group-best

Received Path ID 0, **Local Path ID 1**, version 824121453

Path #2: Received by speaker 0

Not advertised to any peer

4713 2500, (aggregated by 2500 -), (received & used)

45.0.0.1 (metric 1011) from 45.0.0.2 (45.0.0.1)

Origin IGP, metric 0, localpref 600, valid, internal, atomic-aggregate

Received Path ID 0, **Local Path ID 0**, version 0

Originator: 45.0.0.1, **Cluster list: 45.0.0.2**



Juniper: PATH確認方法

```
# show route protocol bgp 203.178.143.143 detail |
```

```
203.178.128.0/17 (3 entries, 2 announced)
```

```
*BGP   Preference: 170/-601
```

```
AS path: 4713 2500 I (Atomic)
```

```
AS path: Recorded
```

```
BGP   Preference: 170/-501
```

```
Next hop type: Indirect
```

```
Source: 45.0.0.30
```

```
Next hop: 45.0.1.206 via xe-1/0/1.151, selected
```

```
Protocol next hop: 45.0.0.30
```

```
AS path: 4713 2500 I (Atomic)
```

```
Addpath Path ID: 1
```

```
BGP   Preference: 170/-101
```

```
Next hop type: Indirect
```

```
Source: 45.0.0.30
```

```
Next hop: 45.0.1.206 via xe-1/0/1.151, selected
```

```
Protocol next hop: 45.0.0.30
```

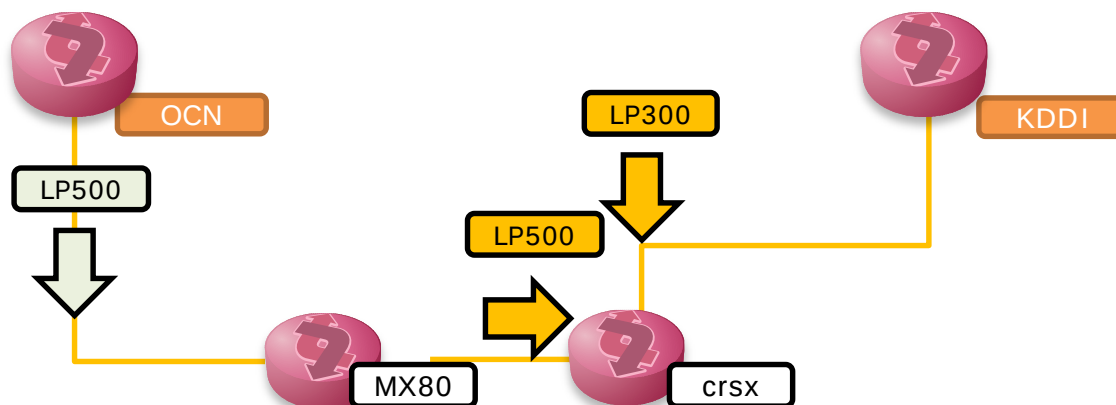
```
AS path: 2500 I (Atomic)
```

```
Addpath Path ID: 2
```

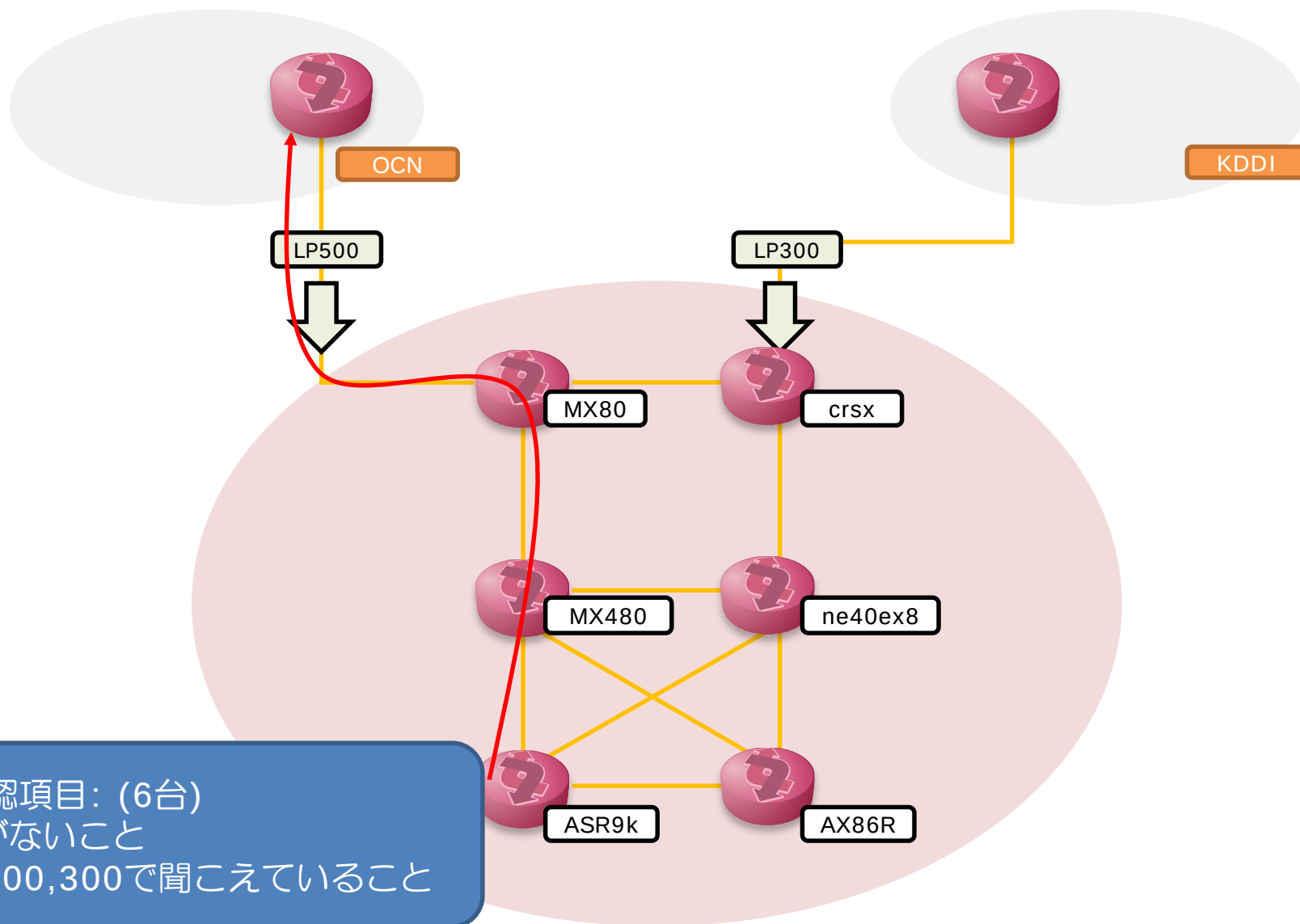
SENDされる経路の違い

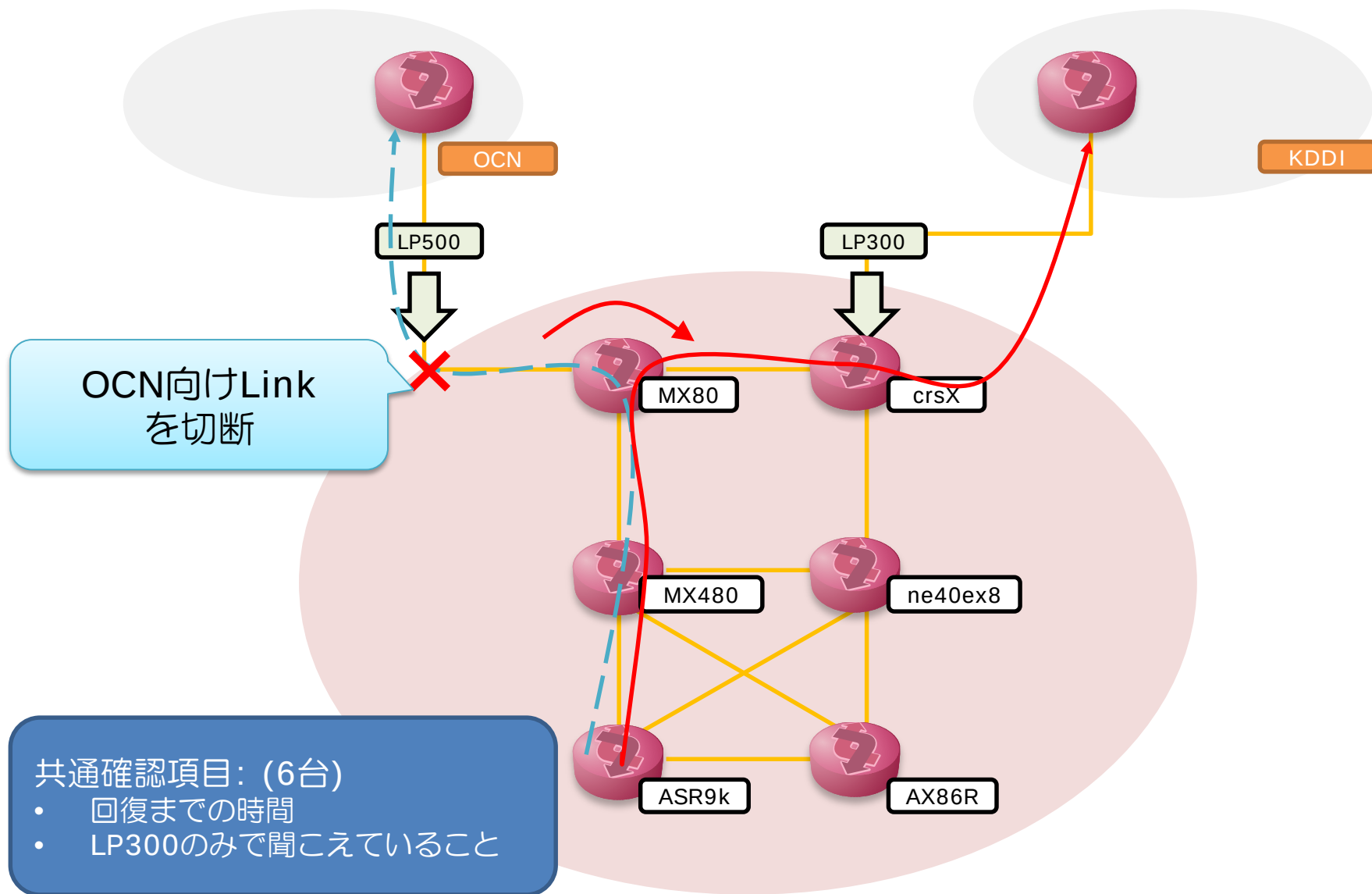
- Juniperにおける挙動
 - 2つの経路が聞こえた場合両方ともadvする
- Ciscoにおけるの挙動
 - 2つのiとiの経路において両方ともadvする
 - 2つのiとeの経路においてiでeより強い経路が聞こえた場合eの経路はiBGPで広告されない

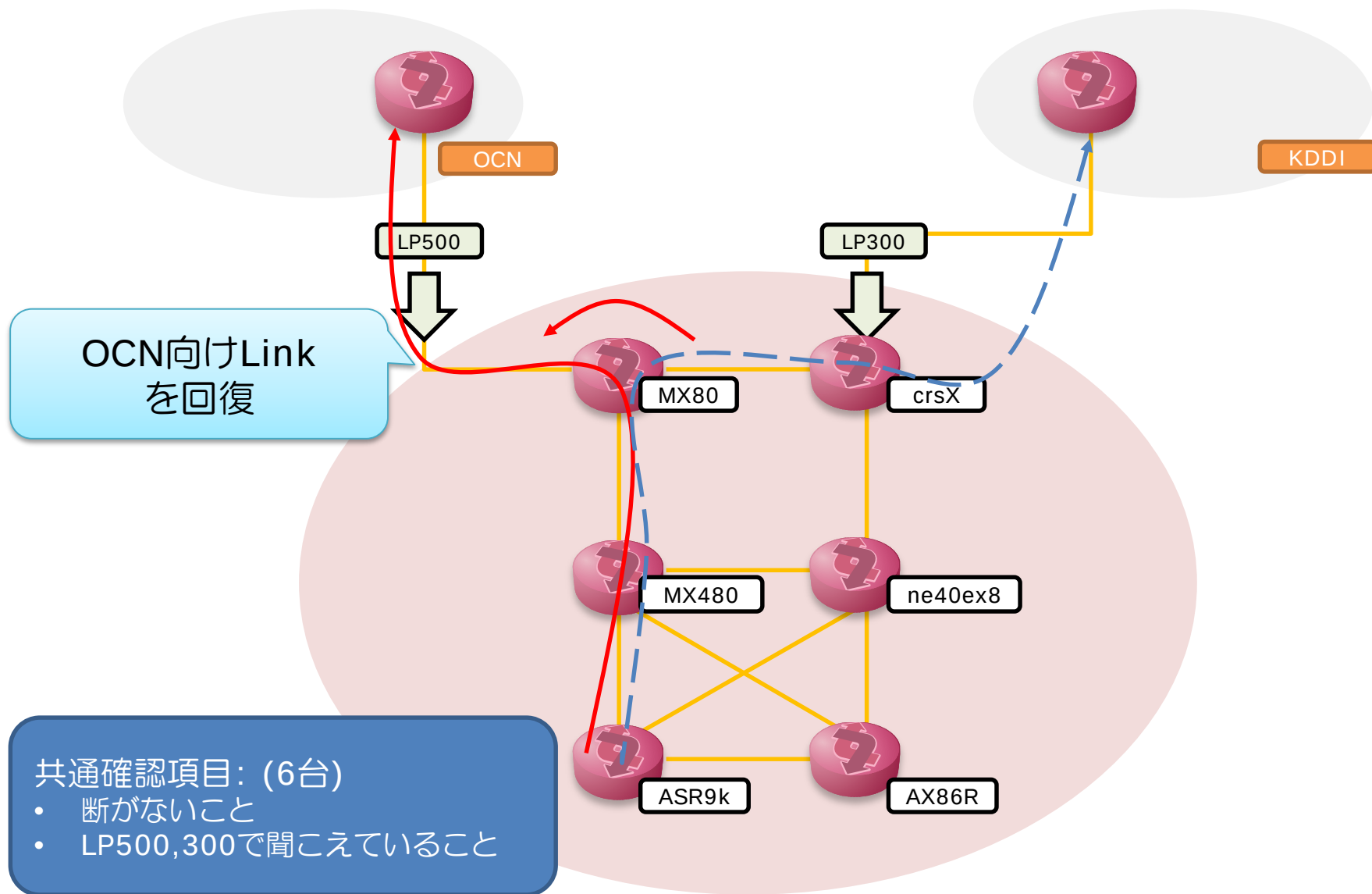
⇒今回はcrs-xにadvertise-best-external投入



- ADD-PATH設定・経路広告
⇒特に問題なし
- ADD-PATHのCapabilityの切替
 - Peerごとに”なし”, “SENDのみ”, “RECVのみ”
“SEND/RECV”を切替
 - ⇒特に問題なし
- 収束時間は...?







- ASBRはRRからADD-PATH recvしてはいけなかったのでは？
- 経路数がそもそも多くなる
 - 計算に時間のかかるルータがいたので引きずられた・・・？
- FIBのインストールにかかる時間
 - そもそも、ADD-PATHの経路がFIBにインストールされていない

⇒「とりあえず対応ルータのADD-PATHを全部enableしよう！」
はダメ



⇒eBGPへの対応

- 既存の実装ではiBGPのみ

- Juniperの例

- ```
kanai@mx480:RR1# commit check
```

- ```
[edit logical-systems RR1 protocols]
```

- ```
Error in neighbor 192.168.25.1 of group AS65537:
```

- ```
Add-path is not supported on external groups / peers
```

- ```
error: configuration check-out failed
```

- 活用例:

- IX上のRouteServerで複数経路を広告できる

- 現在はRS上でBestPath選択

- バイリテラルのような経路広告



# 課題(2/2)

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⇒ベストプラクティスの情報が少ない(と思う)

- そもそもFull-Routeを想定していたか？
- {フルメッシュ,RR}の場合どこにsend/recvをいれる？
- RR同士はADD-PATHしてはいけない
  - RR間のIGPにおいて  
ClusterIDを変えてよいのか？だめなのか？
- ADD-PATH非対応ルータがいる場合、どこにおいて良いのか悪いのか？
- 計算が遅いルータがいる場合、どうなるのか  
(収束時間に影響する？)