

# IPv4 over IPv6 技術の provisioning について 考えてみた

浅間 正和 @ 有限会社 銀座堂

# ASAMAP Update

- 464XLAT PLAT と DS-Lite AFTR に対応しました

## 464XLAT PLAT の設定例:

```
# set interfaces map map0 role br
# set interfaces map map0 br-address 2001:db8::1/64
# set interfaces map map0 default-forwarding-mode translation
# set interfaces map map0 pool 1 pool-prefix 203.0.113.123/32
# set protocols static interface-route 203.0.113.123/32
    next-hop-interface map0
```

## DS-Lite AFTR の設定例:

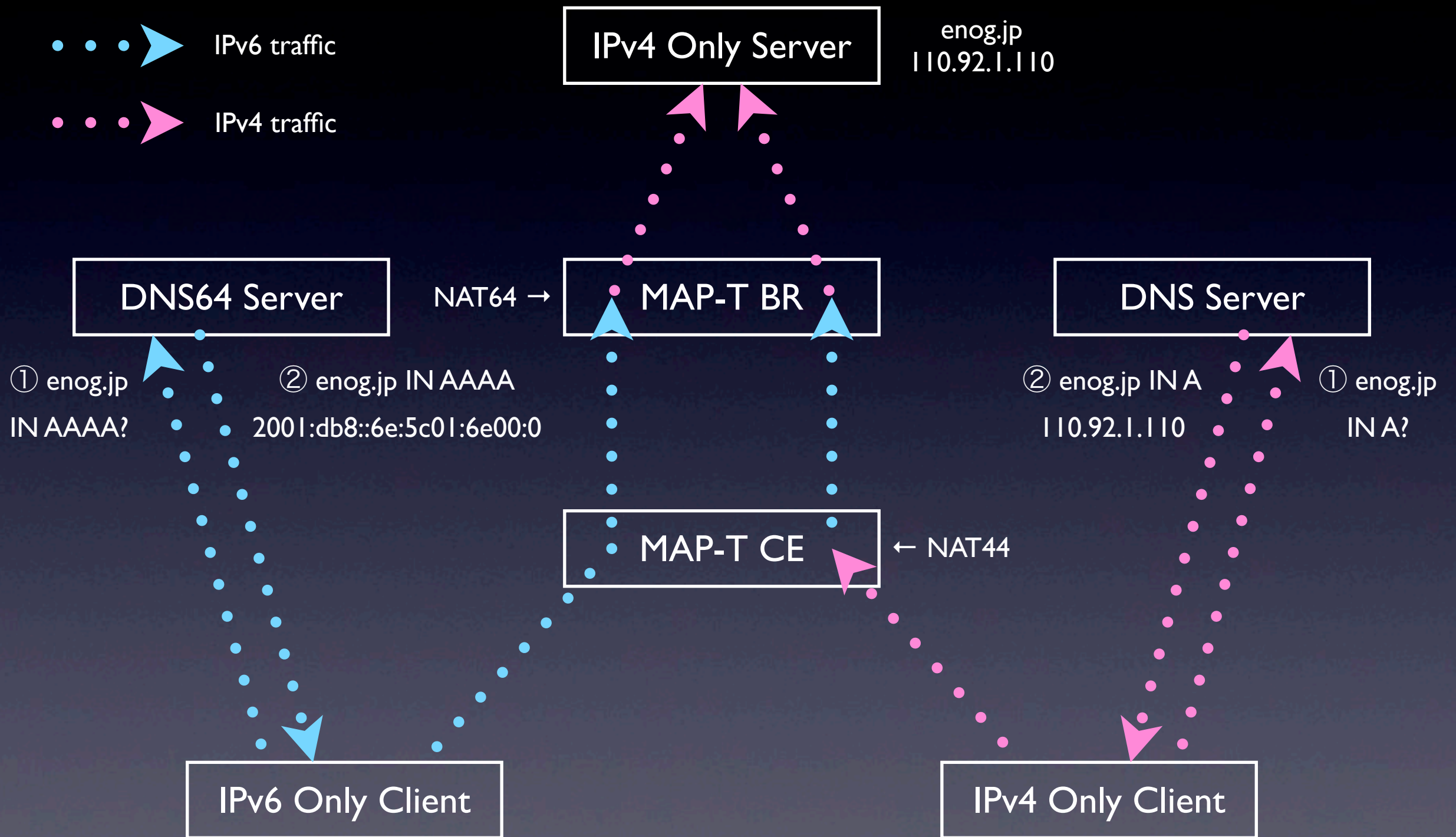
```
# set interfaces map map0 role br
# set interfaces map map0 br-address 2001:db8::1/64
# set interfaces map map0 default-forwarding-mode encapsulation
# set interfaces map map0 pool 1 pool-prefix 203.0.113.123/32
# set protocols static interface-route 203.0.113.123/32
    next-hop-interface map0
```

# 464XLAT PLAT と DS-Lite AFTR 対応

- role が BR で IPv6 → IPv4 の translation/decapsulation 時に source IPv6 address が MAP IPv6 address で無い場合で且つ pool が設定されている場合に動作
- default-forwarding-mode が translation の場合は 464XLAT PLAT として動作
- default-forwarding-mode が encapsulation の場合は DS-Lite AFTR として動作
- 464XLAT PLAT は普通の NAT64 なので DNS64 と組み合わせることで IPv6 Only client から IPv4 Only server への接続も可能に



# MAP-T と 464XLAT



# ということで...

- 以下の機能をサポート
  - MAP-E BR
  - MAP-E CE
  - MAP-T BR
  - MAP-T CE
  - DS-Lite AFTR
  - DS-Lite B4
  - 464XLAT PLAT
  - 464XLAT CLAT
- Lightweight 4over6 と 4rd はサポートしません...

# CPE 側の設定 (464XLAT の場合)

```
# set interfaces map map0 role ce
# set interfaces map map0 tunnel-source eth1
# set interfaces map map0 br-address 2001:db8::1/64
# set interfaces map map0 default-forwarding-mode translation
```



# CPE 側の設定 (DS-Lite の場合)

```
# set interfaces map map0 role ce
# set interfaces map map0 tunnel-source eth1
# set interfaces map map0 br-address 2001:db8::1/64
# set interfaces map map0 default-forwarding-mode encapsulation
```

# CPE 側の設定 (MAP 1:1 の場合)

```
# set interfaces map map0 role ce
# set interfaces map map0 tunnel-source eth1
# set interfaces map map0 br-address 2001:db8::1/64
# set interfaces map map0 default-forwarding-mode translation
# set interfaces map map0 default-forwarding-rule false
# set interfaces map map0 rule 1 ipv6-prefix 2001:db8:89ab::/48
# set interfaces map map0 rule 1 ipv4-prefix 192.0.2.18/32
# set interfaces map map0 rule 1 psid-prefix 0x34/8
# set interfaces map map0 rule 1 ea-length 16
```



# CPE 側の設定 (MAP の場合)

```
# set interfaces map map0 role ce
# set interfaces map map0 tunnel-source eth1
# set interfaces map map0 br-address 2001:db8::1/64
# set interfaces map map0 default-forwarding-mode translation
# set interfaces map map0 rule 1 ipv6-prefix 2001:db8:1234::/48
# set interfaces map map0 rule 1 ipv4-prefix 192.0.2.0/24
# set interfaces map map0 rule 1 ea-length 16
# set interfaces map map0 rule 2 ipv6-prefix 2001:db8:5678::/48
# set interfaces map map0 rule 2 ipv4-prefix 198.51.100.0/24
# set interfaces map map0 rule 2 ea-length 16
# set interfaces map map0 rule 3 ipv6-prefix 2001:db8:9abc::/48
# set interfaces map map0 rule 3 ipv4-prefix 203.0.113.0/24
# set interfaces map map0 rule 3 ea-length 16
```

# CPE 側の設定 (こうしたい)

```
# set interfaces map map0 role ce
# set interfaces map map0 tunnel-source eth1
# set interfaces map map0 br-address 2001:db8::1/64
# set interfaces map map0 default-forwarding-mode translation
# set interfaces map map0 rule 1 ipv6-prefix 2001:db8:89ab::/48
# set interfaces map map0 rule 1 ipv4-prefix 192.0.2.0/24
# set interfaces map map0 rule 1 ea-length 16
# set interfaces map map0 rule 2 ipv6-prefix 2001:db8:89ab::/48
# set interfaces map map0 rule 2 ipv4-prefix 192.0.2.0/24
# set interfaces map map0 rule 2 ea-length 16
# set interfaces map map0 rule 3 ipv6-prefix 2001:db8:89ab::/48
# set interfaces map map0 rule 3 ipv4-prefix 192.0.2.0/24
# set interfaces map map0 rule 3 ea-length 16
```

Provisioning Server 側の設定で

464XLAT/DS-Lite/MAP-T/MAP-E

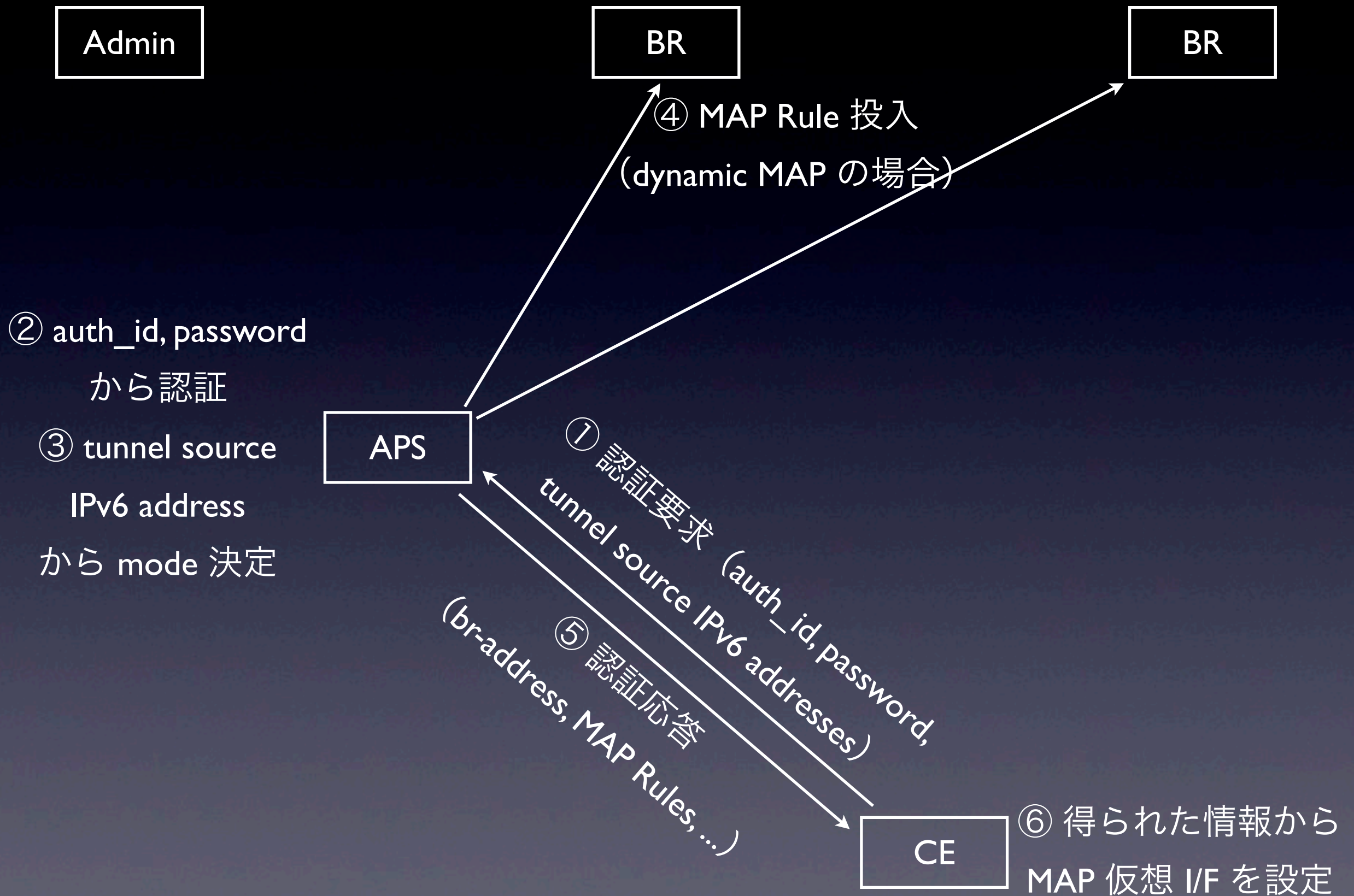
のどれかに自動で設定!



```
# set interfaces map map0 role ce
# set interfaces map map0 tunnel-source eth1
# set interfaces map map0 autoconf-base-url https://authserver/
# set interfaces map map0 autoconf-auth-id 12345678@enog.jp
# set interfaces map map0 autoconf-password *****
```



# ASAMAP Provisioning System





# Rules と Dynamic MAP pools

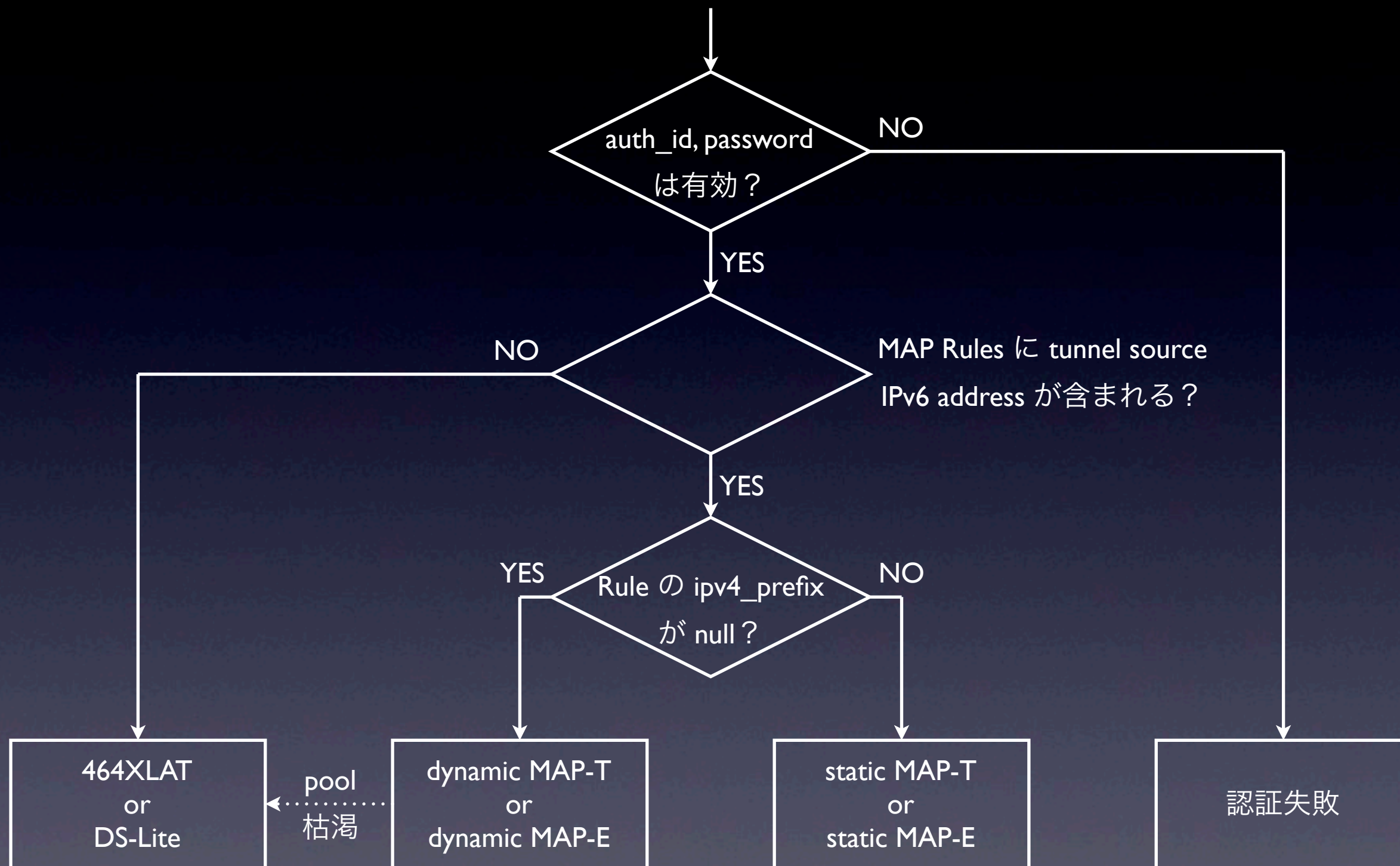
- Rules

rules					
ipv6_prefix	ipv4_prefix	psid_prefix	ea_length	forwarding_mode	forwarding_rule
2001:db8:100::/40	192.0.2.0/24	-	16	encapsulation	TRUE
2001:db8:200::/40	-	-	16	encapsulation	FALSE

- Dynamic MAP pools

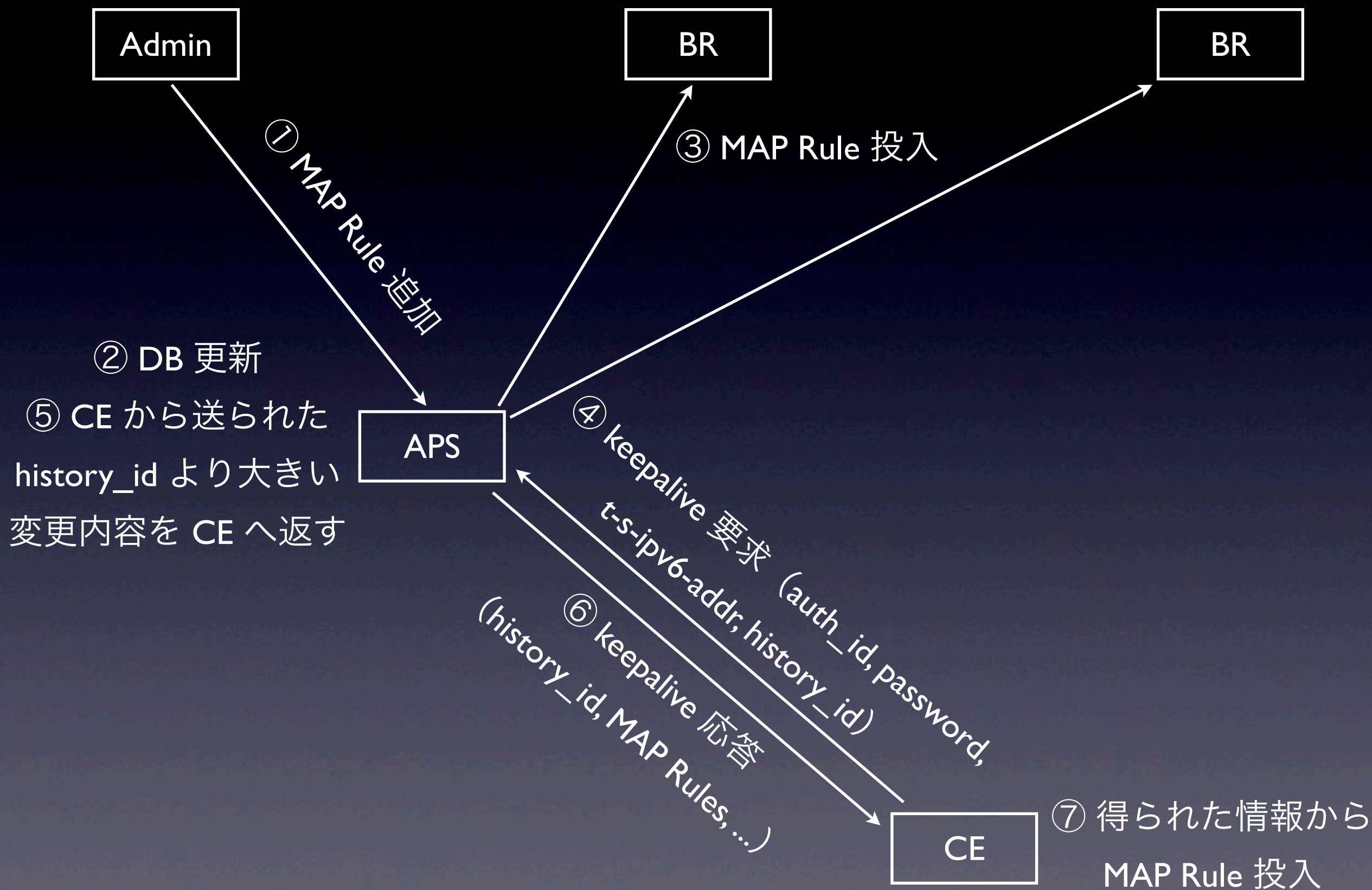
dynamic_map_pools	
ipv4_address	psid
198.51.100.0/32	0x00/8
198.51.100.0/32	0x01/8

# Mode の決定 flow



(translation か encapsulation かは user が属す domain の default-forwarding-mode に依る)

# MAP Rule の管理と CE への配布





# BR 起動時の MAP Rule 参照

Admin

BR

BR

② MAP Rule 応答

① MAP Rule 要求

APS

CE

# APS API

- RESTful API
- POST JSON format data
- Content-type: application/json response
- Commands:
  - Authentication
    - <https://authserver/auth>
  - Keepalive
    - <https://authserver/keepalive>
  - Get MAP Rules
    - [https://authserver/get\\_rules](https://authserver/get_rules)

# Template

- Template



domains							
id	name	br_address	default_forwarding_mode	default_forwarding_rule	psid_offset	ipv6_fragment_size	ipv4_fragment_inner
1	domain1	2001:db8:1::1/64	encapsulation	TRUE	4	1500	TRUE
2	domain2	2001:db8:2::1/64	translation	TRUE	4	1500	TRUE

rules							
id	domain_id	ipv6_prefix	ipv4_prefix	psid_prefix	ea_length	forwarding_mode	forwarding_rule
1	1	2001:db8:100::/40	192.0.2.0/24	-	16	encapsulation	TRUE
2	1	2001:db8:200::/40	-	-	16	encapsulation	FALSE

map_brs		
id	domain_id	real_address
1	1	203.0.113.11
2	1	203.0.113.22

users							
id	domain_id	auth_id	password	last_access	enduser_ipv6_prefix	ipv4_address	psid
1	1	user1	nVWkgmi01W	Sun Feb 17 11:20:07 JST 2013	2001:db8:112:3400::/56	192.0.2.18/32	0x34/8
2	1	user2	rmFpcK03m	Sun Feb 17 11:29:34 JST 2013	2001:db8:256:7800::/56	198.51.100.0/32	0x01/8

dynamic_map_pools			
id	ipv4_address	psid	user_id
1	198.51.100.0/32	0x00/8	-
2	198.51.100.0/32	0x01/8	2

user_authentication_history								
id	user_id	action	when	reason	enduser_ipv6_prefix	ipv4_address	psid	
1	1	add	Sun Feb 17 11:20:07 JST 2013		2001:db8:100::/40	192.0.2.18/32	0x34/8	
2	2	delete	Sun Feb 17 11:20:07 JST 2013	timed out	2001:db8:300::/40	198.51.100.0/32	0x01/8	

rule_management_history									
id	domain_id	action	when	ipv6_prefix	ipv4_prefix	psid_prefix	ea_length	forwarding_mode	forwarding_rule
1	1	add	Sun Feb 17 11:20:07 JST 2013	2001:db8:100::/40	192.0.2.0/24	-	16	encapsulation	TRUE
2	1	delete	Sun Feb 17 11:20:07 JST 2013	2001:db8:300::/40	-	-	16	encapsulation	FALSE