`as-set` and `route-set` Classes

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Macros and Communities

AS Macros associate a name to a set of ASes

- explicit list of members
- name owner controls the set membership

Communities associate a name to a set of routes

- implicit list of members
- members control the set membership

LA IETF:

`route-macro`, `as-community`, `as-macro`, `community`

Set Classes

Combine macros and communities into one class:

- `as-set`
- `route-set`

Membership control:

- explicit list of members
- implicit list of members by referral
- implicit list of members by including other set names
- combination

`as-set` Class

Attributes:

`as-set`	names start with "`as-`"
`members`	explicit list
`members-by-referral`	implicit list

```
as-set: as-foo
members: AS1, AS2, AS3

as-set: as-bar
members: AS4, as-foo, AS5
```


`members-by-referral`

`members-by-referral:`

- list of maintainer names
- **ANY**
- if misssing, only explicit members allowed

```
as-set: as-foo
members-by-referral: MAINT-ME, MAINT-YOU

aut-num: AS3                 aut-num: AS4
member-of: as-foo            member-of: as-foo, as-bar
mnt-by: MAINT-ME             mnt-by: MAINT-YOU
```


Example

```
as-set: as-foo
members-by-referral: MAINT-ME, MAINT-YOU

aut-num: AS3                 aut-num: AS4
member-of: as-foo            member-of: as-foo, as-bar
mnt-by: MAINT-ME             mnt-by: MAINT-YOU

aut-num: AS5
member-of: as-foo
mnt-by: MAINT-OTHER
```

AS5 is not a member of **as-foo**!

Both Explicit and Implicit Membership

```
as-set: as-bar
members: AS1, AS2
members-by-referral: MAINT-YOU
```

```
aut-num: AS3
member-of: as-bar
mnt-by: MAINT-YOU
```

```
aut-num: AS4
member-of: as-foo, as-bar
mnt-by: MAINT-YOU
```


route-set Class

Attributes:

`route-set`	names start with "`rs-`"
`members`	explicit list
`members-by-referral`	implicit list

```
route-set: rs-foo
members: 128.9.0.0/16, 128.9.0.0/24

route-set: rs-bar
members: 128.7.0.0/16, rs-foo
```


Examples

```
route-set: rs-bar
members: 128.7.0.0/16
members-by-referral: ANY

route: 128.9.0.0/16
origin: AS1
member-of: rs-bar

route-set: rs-foo
members: 128.7.0.0/16, AS1, AS-FOO
```


Predefined Sets

`rs-irr`	all routes registered in IRR
`as-irr`	all ASes registered in IRR
`ASno`	all routes originated by `ASno`
`AS-Set-Name`	all routes originated by ASes in `AS-Set-Name`

Hierarchical Set Names

Sequence of set names and AS numbers:

`AS1:AS-CUSTOMERS`

`AS1:RS-EXCEPTIONS:RS-BOGUS`

`AS-ANS:AS-CUSTOMERS`

$X_1:X_2:...:X_N$ can be created by maintainer of $X_1:...:X_{N-1}$

`AS1:AS-CUSTOMERS` can be created only by `AS1`

Example

```
aut-num: AS1
mnt-by: MAINT-FOO

as-set: AS1:AS-CUSTOMERS
members: AS2, AS3, AS4
mnt-by: MAINT-FOO
```