(Introduction to) Intra-Doman Virtual Aggregation


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Goal of this talk:

Introduce Virtual Aggregation (VA) to IDR

Discuss what it would take for IDR to adopt VA as a standards-track work item
Goal of Virtual Aggregation (VA):

**Shrink the FIB**

- Easily 5x to 10x (with little perf penalty)
  - In any and all routers

**Deploy autonomously by any ISP**

- No externally-visible change

**Minor changes to routers**

- Actually, can do it with legacy routers with various config tricks

**Works with mix of VA and legacy routers**
Who needs this?

Many ISPs try to shrink FIBs today
   To extend the life of routers

Two main approaches:
In edge routers: default route to core
   Only where external peers don’t require full BGP tables
      And ISP actually has a core

Simply ignore some routes (/24….)
Who needs this?

Important for many small ISPs today

May be much more important as IPv4 addresses run out and aggregation breaks down

And IPv6 picks up???:)
How it works

Partition address space into “Virtual Prefixes” (VP)

VPs must be bigger than real prefixes

(/2, /3, . . . /9 . . .)

Specific routers know routes for “sub-prefixes” within specific VPs

“Aggregation Points”

Other routers do not require those sub-prefixes
Paths through the ISP

Ingress → Tunnel → Egress

External Peer (Tunnel Target)

Aggregation Point
FIB Suppression

RIB contains all routes

   BGP operation doesn’t change

After decision process, router decides whether or not to “suppress route”

   Not install it in the FIB
What routes cannot be suppressed?

VP routes to Aggregation Points (AP)

If router is AP, sub-prefix routes within VP

All other routes may be suppressed

But don’t have to be, depending on FIB space
Required tunnels (MPLS)
(Required by VA routers and legacy routers alike)

From all routers to all APs

From all routers to all external peers

External peer is target, but egress router strips MPLS header
New Configuration

Select Virtual Prefixes (VPs)

Assign Aggregation Points (APs)

Keep AP redundancy and traffic engineering in mind

(Optionally) select sub-prefixes that should additionally be installed

This could be mostly automatic by router
New failure mode

Aggregation Point (AP) failure

Backup APs must exist

Failover to backup is automatic with BGP

(Dynamic AP selection a possibility)
Next steps (for discussion)

Write 01 draft

Including very helpful suggestions from Daniel Ginsburg and Robert Raszuk

Have IDR consensus to adopt VA as a standards-track work item by Nov meeting