Deployment of 32 bit AS Numbers

Henk Uijterwaal
RIPE NCC

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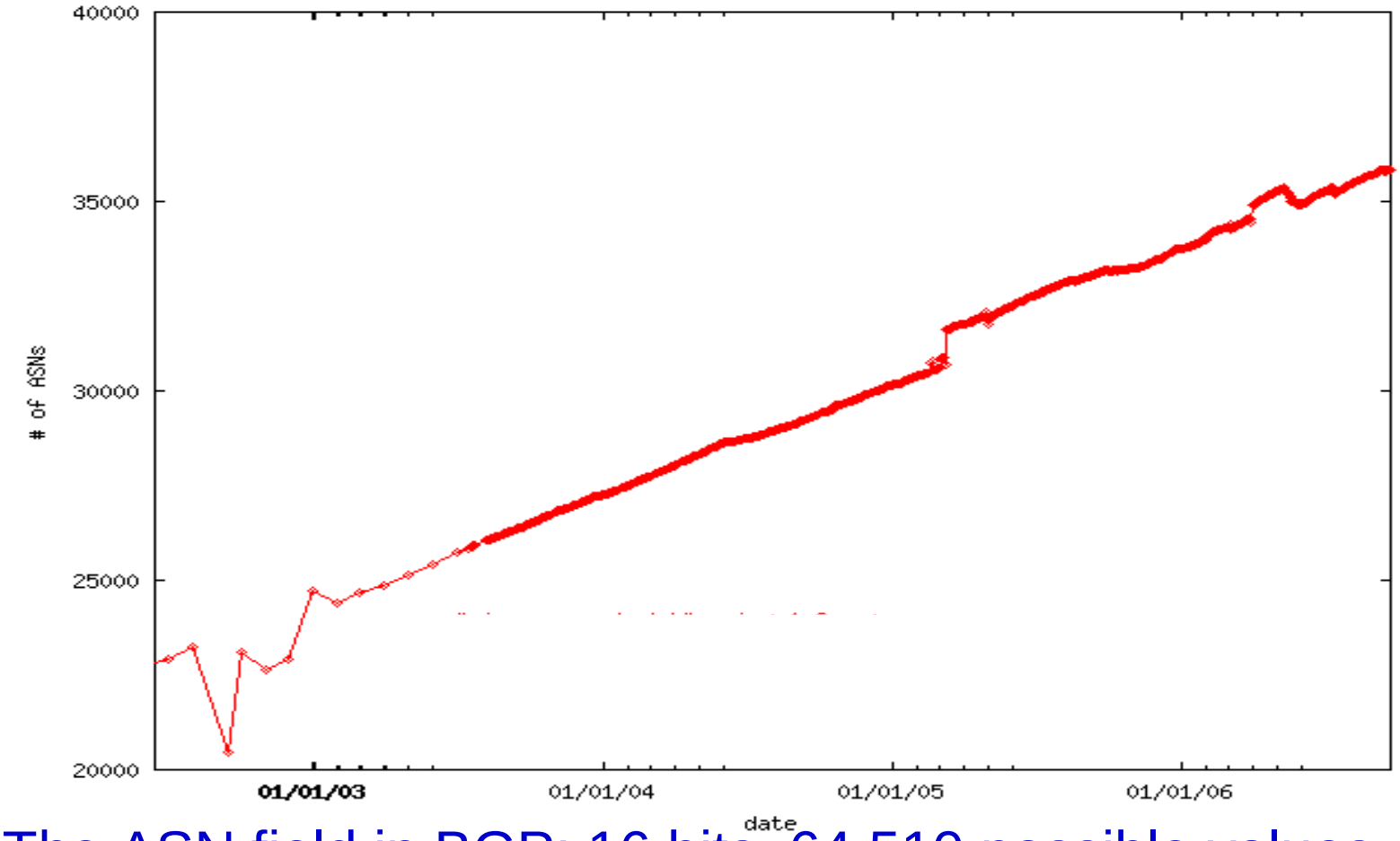
Overview

- Background
- Deployment
- Implementation at the RIPE NCC
- Lessons to be learned

Running out of AS Numbers



- The ASN field in BGP: 16 bits, 64,510 possible values
- On 28/9/2006: ≈36,000 in stats files, ≈6,000 in RIR pools, ≈22,000 left

Running out of AS numbers (2)

- Several studies of consumption rates
  - Rene Wilhelm: ASN-MIA, RIPE50
  - Geoff Huston: AS Numbers, RIPE51
- Allocation rate is 10-12/day
- We will run out sometime of ASN sometime between 2010 and 2013

Let's be pessimistic and assume 2010

We need more ASN !

- Recovery of unused ASN
  - Hard
  - Will only postpone the problem for a few years, not solve it
- Use more bytes for the ASN
  - 32 bit AS or ASN32
  - 32 bits will increase the pool to 4,294,967,296
  - Will be sufficient for a million years

More bits: ASN32

- Details in draft-ietf-idr-as4bytes-11.txt
  - Proposed standard, in IESG queue
  - Implementations exist (well, sort of).
- Transition mechanism exist
  - Existing BGP speakers continue to work
  - New BGP speakers will have to use ASN32
  - No flag date, ASN16 and ASN32 can operate in a mixed world forever

Bottom line: Ready to be deployed

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Deploying the solution

- Get an ASN32
  - Policy for handing them out
  - LIRs have to request them
  - RIRs have to handle the request
- Use your ASN32
  - Upgrade hardware and tools
  - Test
  - Routine operations

ASN32 policy: PDP 2005-12

- 1/1/2007 – 31/12/2008
  - LIR can ask for an ASN16 or ASN32
  - RIR will give an ASN16 by default, ASN32 on request
- 1/1/2009 – 31/12/2009
  - LIR can ask for an ASN16 or ASN32
  - RIR will give an ASN32 by default, ASN16 on request
- After 1/1/2010
  - RIR will always give an ASN32
- No other changes in policies or procedures

ASN32 policy: PDP 2005-12 (2)

- Status:
  - Similar proposals in all 5 regions
  - Consensus reached everywhere
  - Policy as of 1/1/2007
- RIRs have to start handling requests for ASN32 as of 1/1/2007
- LIRs have to be ready to use ASN32 by 1/1/2009
  - … but I have an ASN, why should I care?
  - No new customers?

Let's request an ASN32!

AS Number Request Form

#[GENERAL INFORMATION]#
#[AS NUMBER USER]#
#[ADDRESS SPACE TO BE ANNOUNCED]#
#[PEERING CONTACTS]#
#[DATABASE TEMPLATE(S)]#
aut-num: ASNEW

#[INSERT SUPPLEMENTAL COMMENTS]#
I like an ASN32, please!

#[END of REQUEST]#

NCC has to process these requests

- Our registration systems were designed for ASN16
  - RS forms, tools, database(s)
  - LIR Portal
  - …
- And we use ASN in many more places
  - Peering/routers
  - RIS
  - RRCC
  - RIR statistics
  - …
- We have work to do

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Implementation

- Study (spring'06)
  - Go through all our systems, documents and procedures
  - Define what has to be upgraded
    - Work items for 7 departments
    - About 1.5 to 2 man years of work
- Set up team to do the work
  - Start August '06
  - Ready early '07

The team

- COMMS: Adrian Bedford
- FIN: Martijn Schuuring
- NP: Lorenzo Colitti, Rene Wilhelm
- OPS: James Aldridge, Mark Guz, Gerard Leurs, Cagri Coltekin
- RS: Alex Le Heux, Laura Cobley
- SED: Denis Walker, Vlad Patenko, Oleg Muravsky, Katie Petrusha, Erik Romijn
- TS: Ferenc Csorba, Arno Meulenkamp

- Henk Uijterwaal, Project Manager

First problem: Notation

- Not specified in draft-ietf-idr-as4bytes-11.txt
  - "x:y" has been used, e.g. "1234:5678"
  - Easy to confuse with community strings
  - Need something else
- Proposal in draft-michaelson-4byte-as-representation-01
- Proposal:
  - ASx for ASN16
    - AS0…AS65535
  - ASz.y for ASN32
    - AS1.0 … AS65535.65535

Notation

- Discussion
  - Different from all other BGP attributes
  - Accepted by at least 1 vendor
- Open question: is AS0.3333 a valid notation?
- Work item for the IETF-IDR WG
  - Comments on the mailing list
  - Likely to be turned into an RFC after November meeting

RPSL

- RPSL has to support ASN32
- RPSL has an extension mechanism, use this?
  - 30 new attributes
  - All ASN32 equivalent of exisiting attibutes
- Impractical

RPSL

- Alternative: draft-uijterwaal-rpsl-4byteas-ext-01.txt
  - Use the asx/asy.z notation as in the Michaelson draft
  - Added:
    - On output a “0.” MUST be dropped,
    - “0.” MAY be accepted on input
- This requires tools to be upgraded
  - One time exercise
  - List of affected attributes is in the draft
- Comments on the RPSLng list
  - rpslng@ripe.net

Update software, main issues

- The new format
  - Parsing of ASN on input
  - Formatting on output
  - Danger: Some languages will treat “x.y” as a floating point number without warning
- Sufficient bits
  - ASN have been 16 bits “forever”
  - Code using unsigned short int’s will break immediately…
  - … but what about regular int’s?
  - Will break in the future

Routers

- Vendors:
  - Juniper and Redback have officially announced an implementation
  - Cisco has an implementation but not officially announced
  - Unfortunately only for their high end routers

- Lower end equipment:
  - Chicken and egg problem
  - Input to vendors should come from future customers
  - Speak up!
  - You will need this for your new customers

Supporting systems

- Software routers: Quagga
  - Plans but no ETA
  - This will affect the RIS and related tools
  - No solution yet
  - No RIS peerings with ASN32 speakers until solved
- Monitoring:
  - Nagios:
    - BGP MIB needs to be updated
    - Draft expired, status unclear
    - Speak up in IDR WG
  - Same applies to other tools based on BGP MIB's

Other stuff

- Training material
- Documentation
- Scripts
  - RIR statistics report
  - Billing
  - …

NCC planning

- Whois software: new versions available ≈12/10
- Essential systems
  - (Internal) trial requests for ASN32 possible 1/11/2006
  - LIR requests by 1/1/2007
- Other systems: early 2007
  - Strongly depends on vendors

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Lessons to be learned

- Upgrading to ASN32 is not rocket science
- It is a lot of work though:
  - NCC
    - 1.5 to 2 man years, 7 departments
  - Supporting systems only:
    - Medium sided network
    - 0.5 to 0.75 man years

What should you do

- Start thinking about ASN32 in your organization
  - NOW!
- Ask your vendor for support
  - or be prepared for a nasty surprise in 2009
- Don’t wait until you get assigned AS1.5432 in 2009 and don’t know what to do with it

Questions?