Address management in IPv6

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More than meets the eye

- more than just a protocol
- needs a lot of high-level support
- ETHZ – automation case study
- now what?

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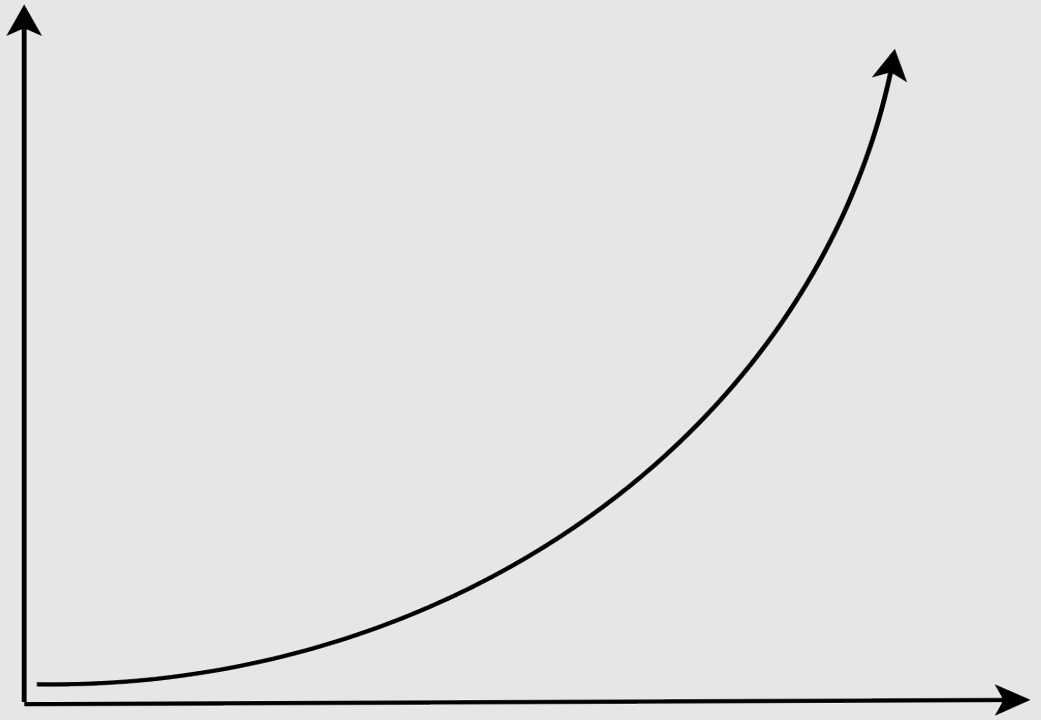
Important graph.



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ETHZ

Eidgenössische technische Hochschule, Zürich

3000 VLANs

50,000 switch ports

25,000 connected nodes

557 zones & 250000+ DNS entries

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ETHZ

Eidgenössische technische Hochschule, Zürich

200 or so institutes, departments, faculties, schools, professorships, research groups, and administrative areas.

All fiercely independent.

Managing it all - goals

- as dynamic as possible
- our database is The Source
- distribute the operational workload
- centralise policy and control
- responsiveness

DHCP Advantages

- most hosts identically configured
- no need to (re)configure IP, DNS, WINS
- mobility between subnets
- (much) better use of address space
- can centralise policy

DHCP Disadvantages

- reliance on server for connectivity
- possible to run out of addresses
- lease time is lead time on changes
- extra things to troubleshoot

The big question

But IPv6 has all this automatic addressing stuff! Why are we even *talking* about DHCP?

Good question. We'll get back to it.

Things DHCP needs to know

- subnets and masks
- what addresses to manage
- what extra stuff to send
- reservations
- domains, zones, servers, TSIGs

Looks simple. It isn't.

- change requests from inside and outside
- change request handling scales badly
- control has to be centralised
- the service has to be centralised
- these seem to conflict

Managing DHCP

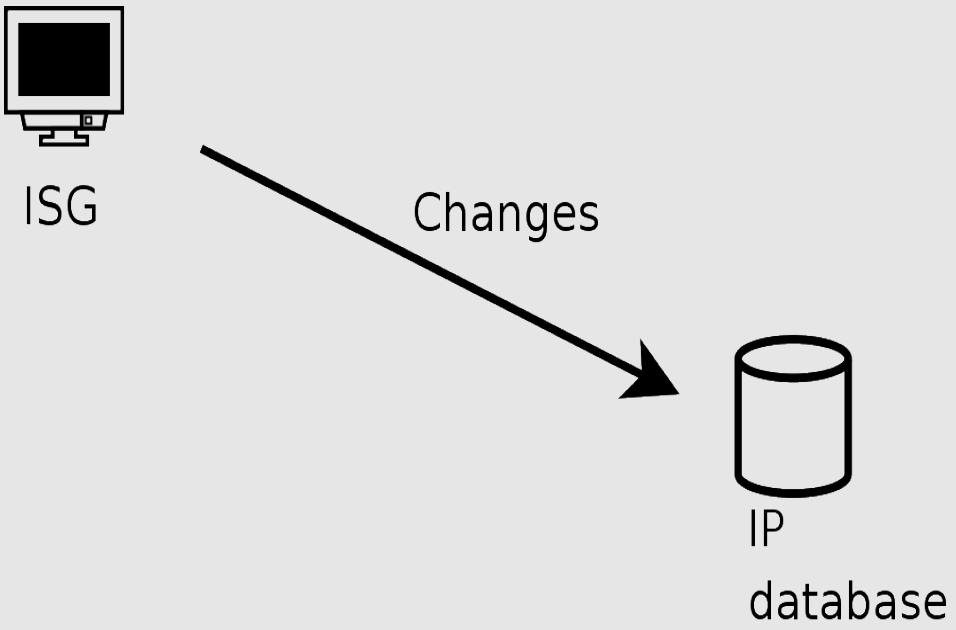
- GUI/Web for access to DB
- most editing work is done by ISG
- changes in DB trigger transactions
- transactions processed into DHCP
- we only have to do exceptions

A DHCP transaction

Reserve an IP address:

Attribute	***Value***
synch_type	DHCP-FIX
action	I or D
a	M (MAC) or C (client ID)
b	MAC or client ID
c	IP address

ISGs make changes...



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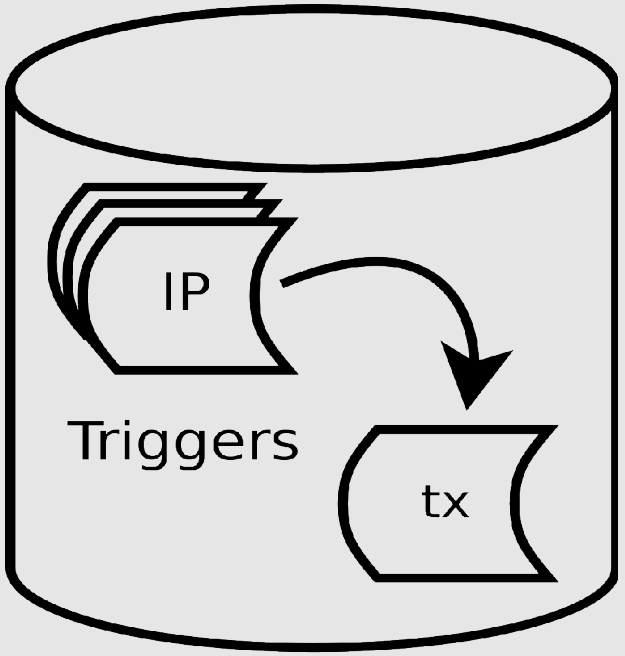
Triggers generate transactions...



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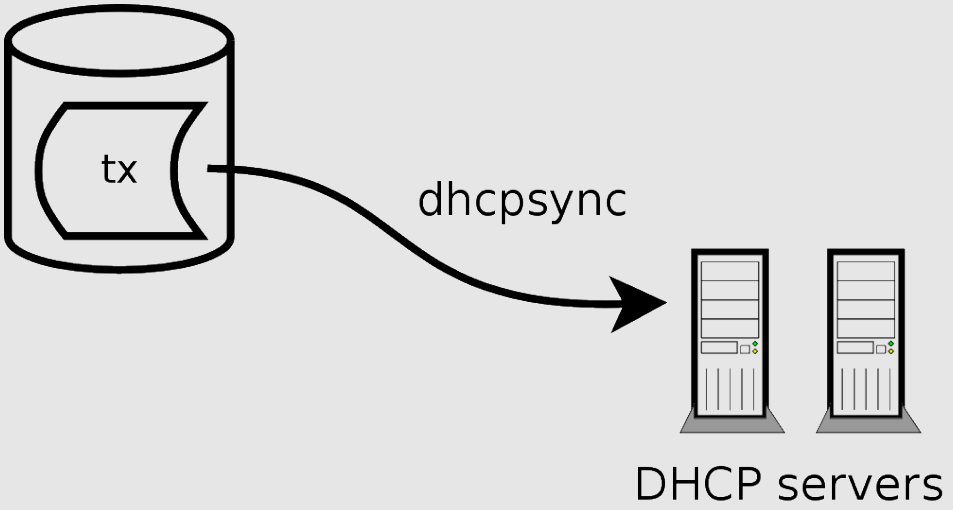
syncher processes transactions.



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Remember the goals?

- as dynamic as possible
- our database is The Source
- distribute the operational workload
- centralise policy and control
- responsiveness

The results = the goals

- VERY minimal static config
- our database is The Source
- other people do most data entry
- policy and control are centralised
- changes well inside 15 minutes

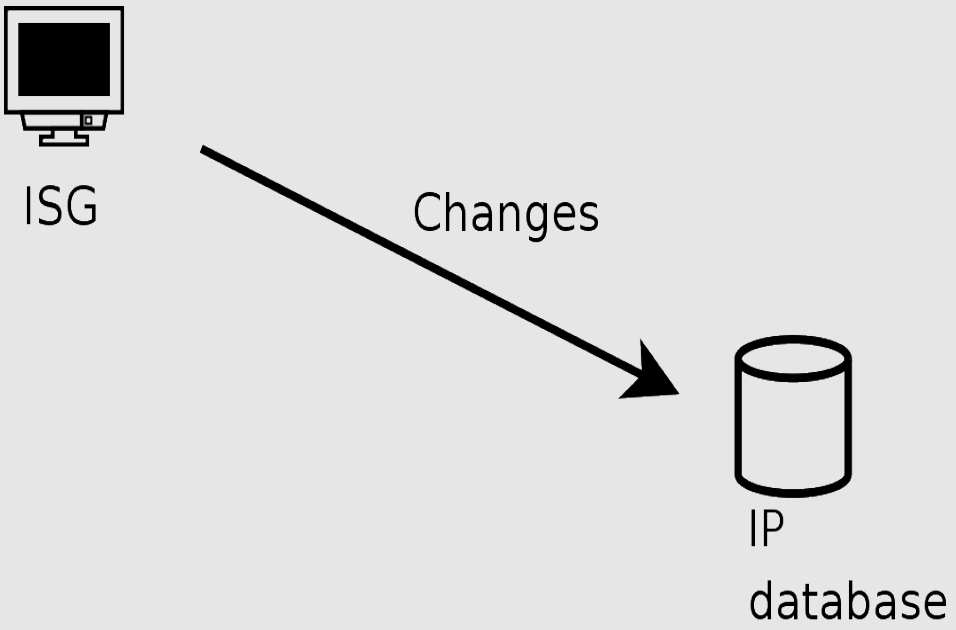
Addresses are only half the story!

- On most sites, hosts need names
- forward and reverse entries
- You do NOT want to do this by hand
- DHCP can do dynamic DNS (DDNS)
- so hosts can manage their own names

DDNS drives change

- can't just rewrite zone files
- part dynamic = all dynamic!
- reverse zones all dynamic anyway
- solution: Transactions again

ISGs make changes...



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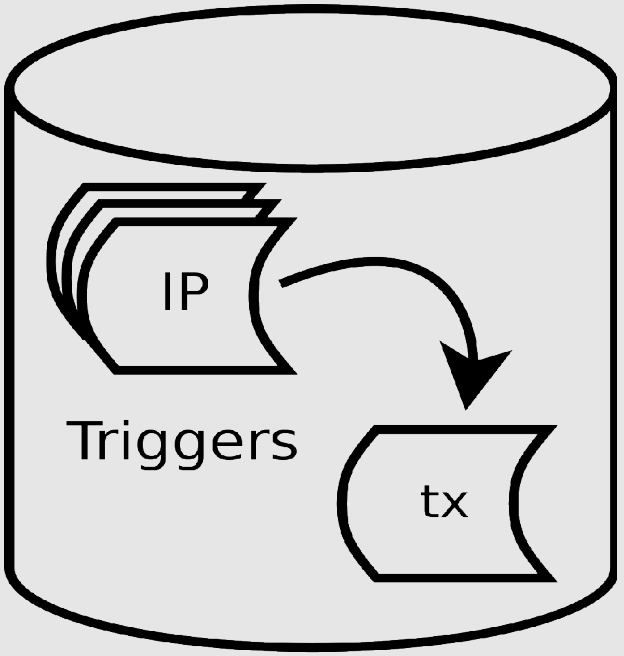
Triggers generate transactions...



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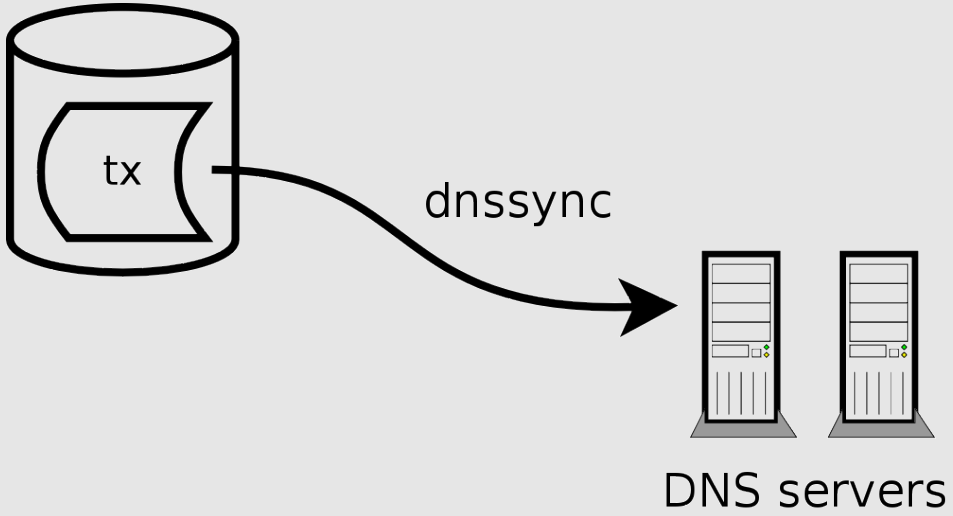
syncher processes transactions.



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DDNS by DHCP clients?

- client can write *any* names!
- not practically protectable
- clients will typically not clean up
- clients must have full info

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DDNS by DHCP server!

- clients can only hint
- only servers have update rights
- servers can clean up at end of lease
- servers can add domain info
- servers prequalify updates

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Downsides to all this

- exceptions bypass the database
- relatively complex to do new stuff
- not practical with ISC DHCP
- needs programming, not just admin skills

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Upsides

- fewer errors = happiness
- less troubleshooting
- concentrate on needs, not processes
- people feel in control of their own areas
- scales well

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Life is good

We are *not*

going back

to the old days!

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The big question

But IPv6 has all this automatic addressing stuff! Why are we even *talking* about DHCP?

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The answers

- DHCP offers fuller control
- DHCP does names too (with DDNS)

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The answers

PS:

- automatic addresses expose MACs
- temporary addresses hard to troubleshoot

These are way less important.

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From RFC2462

"The stateless approach is used when a site is not particularly concerned with the exact addresses hosts use, as long as they are unique and properly routable. The stateful approach is used when a site requires control over exact address assignments."

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DHCP needed features

- on-the-fly configuration
- persistent storage
- failover
- DDNS support
- DHCP options e.g. DNS servers
- industrial strength

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The bad news

No usable DHCPv6.

- none are “industrial strength”
- all of them use text file config
- failover conspicuously absent

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The good news

DHCPv6 is being worked on.

- ISC is allegedly developing one
- Nominum has one coming
- Dibbler is getting interesting
- WIDE/KAME, DHCPv6

Summary

- you need DHCP
- so you need DHCPv6
- you probably can't “go back”
- so start playing now

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Thank you - questions?

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Resources

- RFC 2460, 2462, 3315, 3736
- RFC 3633, 3646, 4361, 3901
- klub.com.pl/dhcpv6
- dhcpv6.sourceforge.net
- www.freshports.org/net/dhcp6
- www.nominum.com

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