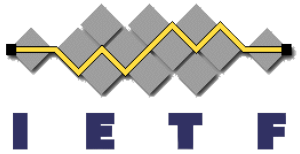
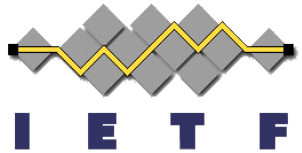
Renumbering Networks: RFC 4192

Fred Baker

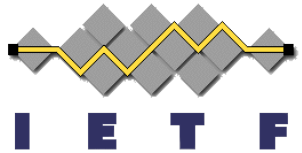


How RFC 4192 came to be



- I heard one too many times on operational lists “it is impossible to renumber a network”
- Wrote a simple step by step plan to renumber a network without a flag day
  - Add a new prefix, observe it working, then remove old
- Asked operators: “I already understand that I don’t understand the issue: make me understand”
- Ralph and Eliot came alongside to add DNS and DHCP configuration changes
  - Add new addresses, test effectiveness, then drop old
- Result: a “first draft” of a renumbering plan that can be used by an operator renumbering his network

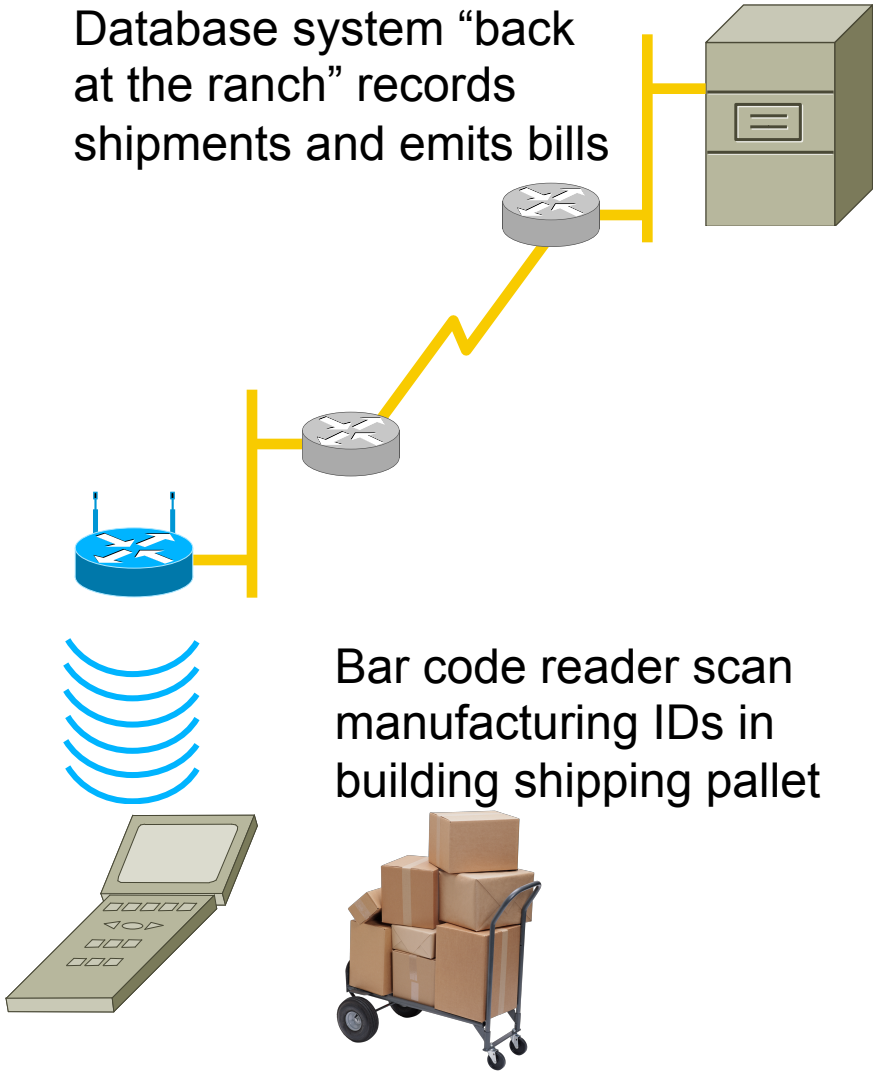
What is hard about renumbering networks?



- **Almost any configuration tool can change a network's configuration from one set of numbers to another**
  - Network management tools like SNMP or Netconf
  - Purpose-built protocols like RFC 2894
  - Operational procedures such as suggested in v6ops
- The big learning from operators:
  - Anything you can algorithmically fix is irrelevant to the real problem
  - The first problem is **human stupidity**
  - The second problem is **configuration paradigms**

Example of human stupidity

- Cisco outsources much of its manufacturing and shipping
- Bar code scanners associate packages with orders and report to a database
- They didn't (at the time RFC 4192 was written) use a domain name to get the address: **they *knew* the address**
- Implication: **change the address, have a day without revenue**
- The fix: it's called **DNS**



Example of a configuration paradigm

- On a router, many things are configured numerically
  - Route maps
  - Addresses on interfaces
  - Access lists
  - Etc…
- It's easy to say "change the paradigm to configuring names"
  - No problem, they will now look up the names
- Wherever you put the **names** has to be configured with **numbers**

My view of network renumbering

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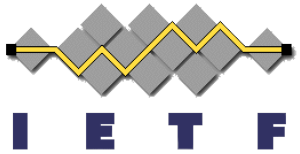
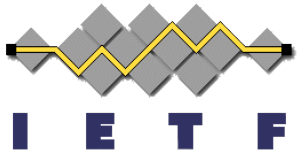
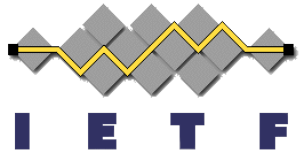


Renumbering a network



- Is a special case of *numbering* a network
  - How did prefixes get there in the first place?
- The simplest approach, to me:
  - Build a configuration management tool
    - Access lists, route maps, QoS policies, etc…
    - DNS and DHCP configurations come from the same tool
  - Among its methods, include
    - **Add** prefix to interface (implies “add address to resource record” for relevant hosts)
    - **Delete** prefix from interface (implies “delete address from resource record” for relevant hosts)

Renumbering a network from your configuration management tool



- Numbering a network:
  - “Add” prefixes to router interfaces, and let routers advertise them in Neighbor Discovery
  - Maybe add others from time to time.
- Renumbering a network
  - “Add” additional prefix(es) to the network
  - “Delete” older prefix(es) once you are not dependent on them…