Practical Traceability (101)

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by Richard Clayton

Reading List

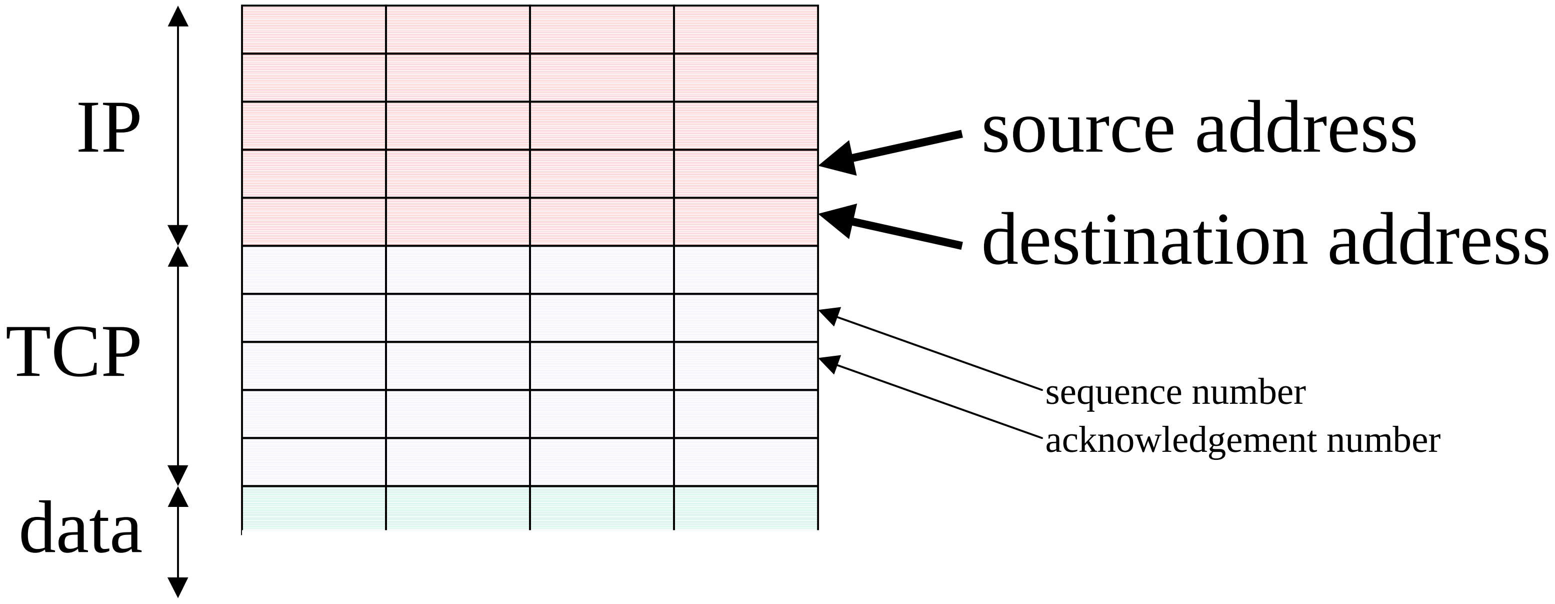
`http://www.linx.net/noncore/bcp/traceability-bcp.html`

written by UK ISP industry;
edited by Richard Clayton

Outline

- TCP/IP refresher
- When IP addresses don’t work
- When IP addresses work
- Finding the source
- Dealing with dialup
- Hiding on a LAN

All you need to know about TCP/IP (almost)



IP

TCP

data

source address

destination address

sequence number

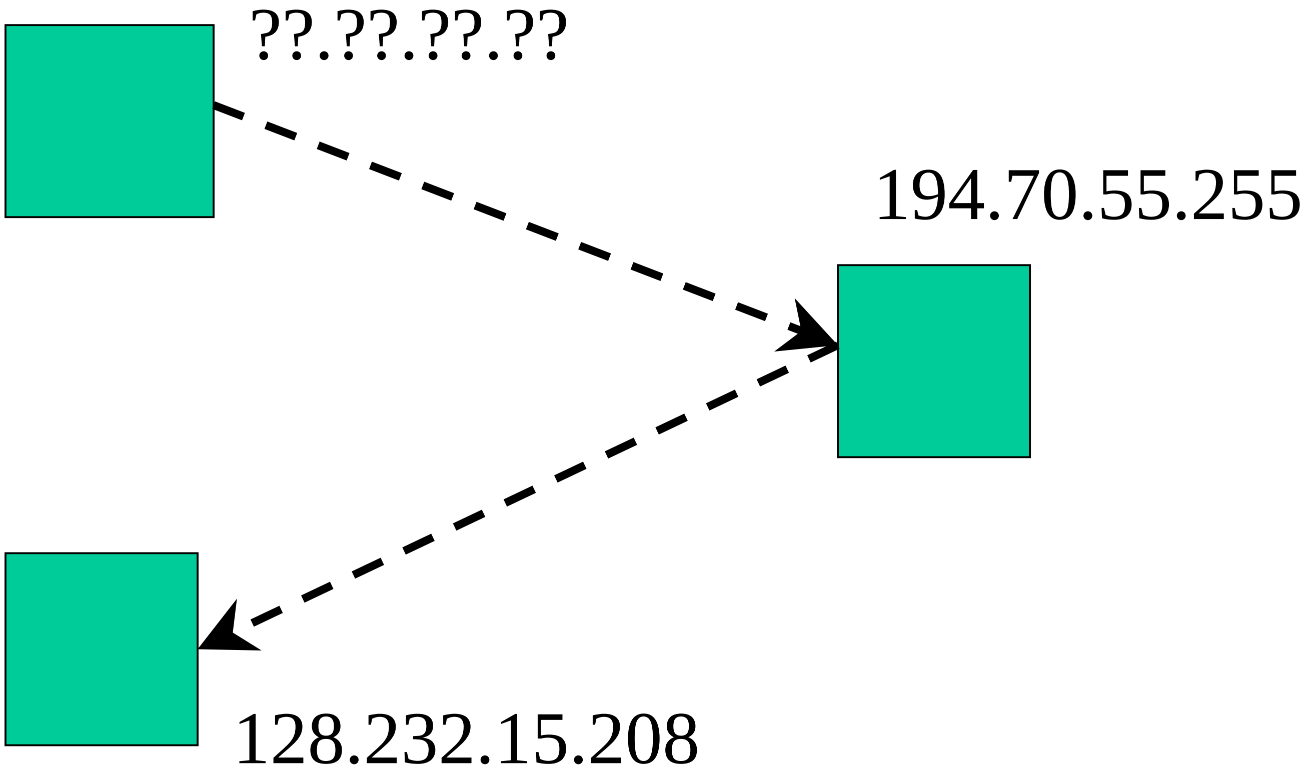
acknowledgement number

Are addresses valid ?

- Destination address is always valid
- Source address is valid for 2-way traffic

- Can do denial of service with 1-way traffic
- Can spoof addresses if stack poorly written
- Filters can be useful in providing validity; but beware of source routing

DoS: smurf attack



Smurf protection

- Ingress filtering (RFC2267)
- Change directed broadcast rules (RFC2644)
- “Name and shame” lists for amplifiers
  http://www.netscan.org
- Low probability responses for tracking
- Detection of flows on border routers and at exchange points

Spoofing

- 3-way handshake

-->	SYN	client offset
<--	SYN-ACK	server offset
-->	ACK	

- If offset (and other info) is predictable don’t need to see the return traffic to have a successful conversation
- Described by Morris (85) and CERT (95)

Who owns an address ?

- Regional registries issues numbers
  ARIN, APNIC & RIPE
- ISPs reallocate within their blocks
- Hence “whois” will yield owner
- Reverse DNS should also yield name
  eg: for 100.101.102.103:
  103.102.101.100.in-addr.arpa

If the owner is unclear ?

- Traceroute may give a clue

```
 5    59 ms    61 ms    64 ms
                tele-border-12-168.router.demon.net
 6    65 ms    66 ms    63 ms  linx.u-net.net
 7    64 ms    61 ms    63 ms  194.119.177.228
 8   179 ms    66 ms    62 ms  213.2.253.5
 9    62 ms    61 ms    63 ms  212.188.191.1
10     *        *        *     Request timed out.
```

- ie: try to identify upstream providers

Traceability of email

```
Received: from pop3.demon.co.uk by rnc-portable.turnpike.com with POP3
 id "happyday.972662921:20:06557:0".happyday@pop3.demon.co.uk>
 for <happyday@pop3.demon.co.uk> ; Fri, 27 Oct 2000 17:09:15 +0100
Return-Path: <chris@cjt.co.uk>
Received: from punt-2.mail.demon.net by mailstore for richard@highwayman.com
          id 972662921:20:06557:0; Fri, 27 Oct 2000 16:08:41 GMT
Received: from finch-post-12.mail.demon.net ([194.217.242.41])
          by punt-2.mail.demon.net  id aa2110410; 27 Oct 2000 16:08 GMT
Received: from cjt.demon.co.uk ([193.237.160.201])
   by finch-post-12.mail.demon.net with esmtp (Exim 2.12 #1)
   id 13pC3U-000CZt-0C
   for richard@highwayman.com; Fri, 27 Oct 2000 16:08:39 +0000
```

Traceability on USENET

```
Xref: news.demon.co.uk demon.ip.support.turnpike:53979
Path: news.demon.co.uk!demon!happyday.demon.co.uk!turnpike.com!richard
From: Richard Clayton <richard@turnpike.com>
Newsgroups: demon.ip.support.turnpike
Subject: Re: Can’t seem to set a global for email
Date: Sat, 28 Oct 2000 12:06:26 +0100
Message-ID: <ZtZltlCyMr+5EAty@turnpike.com>
References: <jsH65KAiZK+5EwqI@btinternet.com>
NNTP-Posting-Host: happyday.demon.co.uk
X-NNTP-Posting-Host: happyday.demon.co.uk:158.152.30.53
X-Trace: news.demon.co.uk 972731811 nnrp-12:7455 NO-IDENT
   happyday.demon.co.uk:158.152.30.53
X-Complaints-To: abuse@demon.net
```

Traceability on IRC

- Need to map nickname to server to IP address
- May be intentionally untraceable

- Different policy aims may be present
  - children should be anonymous
  - dirty old men should not be anonymous

Identifying dialup users

- Dynamic IP is commonplace
- RADIUS logs connect and disconnect
- Hence from time + IP can deduce account

- Various “gotchas”
  - UDP means logs incomplete
  - Time may be inaccurate
  - Logs are large and only kept short-term

More practical problems

- RADIUS and IP allocation may be done by different organisations
- Account may be generic (sales promotion)
- Remote machine may only have DNS record (and hence IP address is deduced)

Identifying the user

- Ask them for name and address
- Credit card info
- Telephone callback
- Other relationship (store card, account no)
- Caller Line Identification (CLI)

CLI

- Engineering CLI travels to switches, user (or presentation) CLI can be withheld (141)
- ISPs will get engineering CLI “soon”
- CLI tends to fail:

  on international calls
  at telco boundaries
  when using bulk carriers

Passwords

- Passwords are poor identifiers
  - ISP staff
  - household
  - post-it notes
  - Usenet
  - social engineering
- Accounts may be legitimately used by many people; so spotting extra use can be hard

Traceability on LANs

- A LAN is a broadcast medium
- Naïve to think MAC addresses are fixed
- Possible to steal MAC & IP addresses
- Hard to locate senders
  - big practical problem for DHCP
  - bridges know direction
  - can fingerprint the NICs

More complications

- Network Address Translation
  - used to preserve IP address space
  - used to hide network architecture
  - unlikely to be logged
- DHCP
  - dynamic allocation of addresses
  - logging can be problematic

Authenticity

- Logs need to be authentic & correctly timed
- DNS needs to be trustworthy
- IP Allocations need to be documented
- Machines need to be secure
- Staff need to be trustworthy

  nightmare scenarios :

  chasing a sysadmin or ISP staff

Retention & Preservation

- Data Retention is a matter for Data Protection legislation; have to show a business need
- Data Preservation is at the request of Law Enforcement to prevent auto-erase. Work is going on within the G8 to provide trans-border requests and some form of fast divulge to allow multi-hop traceability.

“Real anonymity”

- Chained remailers (use Chaum MIXs)
- Freedom network (zeroknowledge.com)
- Anonymising caches
  not all they seem (www.privada.com)
- Onion routing (encrypted source routeing)
- “Crowds” (pass the parcel)
- DC-nets (Chaum again)

Review

- 2-way traffic means IP address trustworthy
- Registries and traceroute will locate ISP
- ISP logging will locate the account
- Account details will reveal user
- CLI will reveal dialup user
- Local records (NAT/DHCP) will reveal a LAN user

“Practical anonymity”

- Steal a password
- Use a free account and withhold your CLI
- Use a pre-paid WAP phone
- Use a cybercafe
- Use a LAN
- Multiple jurisdictions will slow tracing down
- NB: Best Practice is far from universal