Transparencias

de

Redes de Ordenadores

Tema 9

Nivel de Red: IP
3ª Parte - ICMP

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ICMP

ICMP
Internet Control Message
Protocol

- Hace uso de IP pero es un protocolo independiente dentro del nivel de red

ICMP HEADER

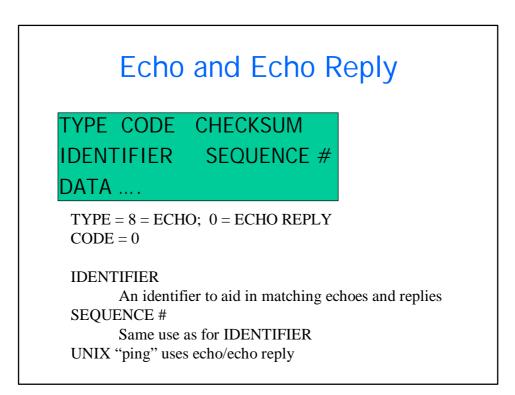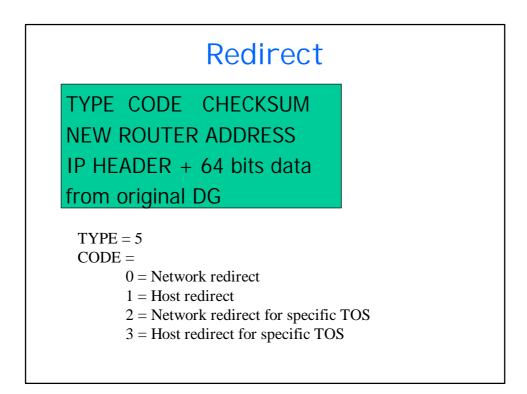| IP HEADER	{	**IP HEADER** **PROTOCOL = 1**
IP DATA	{	**TYPE CODE CHECKSUM** **REMAINDER OF ICMP** **MESSAGE (FORMAT IS TYPE** **SPECIFIC)**

ICMP Types

- Echo - Echo Reply (ping)
- Redirect (use other router)
- Destination Unreachable (prot, port, host)
- Time Exceeded
- Source Quench
- Checksum Failed
- Reassembly Failed
- Cannot Fragment

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Echo and Echo Reply

```
TYPE  CODE   CHECKSUM
IDENTIFIER     SEQUENCE #
DATA ....
```

TYPE = 8 = ECHO; 0 = ECHO REPLY
CODE = 0

IDENTIFIER
        An identifier to aid in matching echoes and replies
SEQUENCE #
        Same use as for IDENTIFIER
UNIX "ping" uses echo/echo reply

Redirect

TYPE CODE   CHECKSUM

NEW ROUTER ADDRESS

IP HEADER + 64 bits data

from original DG

TYPE = 5
CODE =
    0 = Network redirect
    1 = Host redirect
    2 = Network redirect for specific TOS
    3 = Host redirect for specific TOS

Destination Unreachable

TYPE CODE   CHECKSUM

UNUSED

IP HEADER + 64 bits data from original

DG
TYPE = 3
CODE
    0 = Net unreachable
    1 = Host unreachable
    2= Protocol unreachable
    3 = Port unreachable
    4 = Fragmentation needed but DF set
    5 = Source route failed

Time Exceeded

```
TYPE  CODE   CHECKSUM
UNUSED
IP HEADER + 64 bits data from original
DG
```

TYPE = 11

CODE

   0 = Time to live exceeded in transit

   1 = Fragment reassembly time exceeded

Source Quench

```
TYPE  CODE   CHECKSUM
UNUSED
IP HEADER + 64 bits data from original
DG
```

TYPE = 4; CODE = 0

Indicates that a router has dropped the original DG or may indicate that a router is approaching its capacity limit.

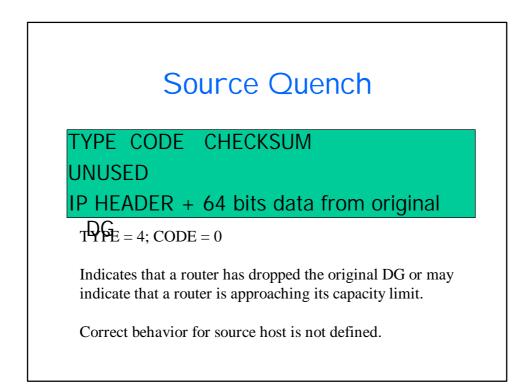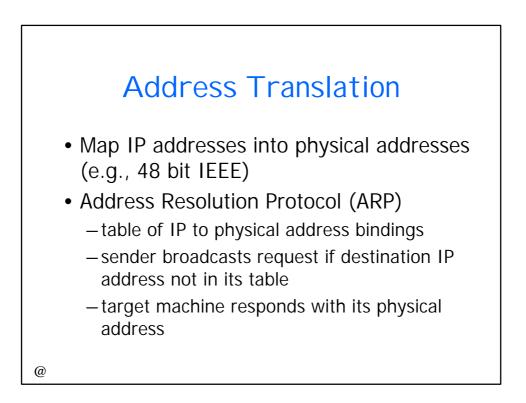Correct behavior for source host is not defined.

Traceroute

- UNIX utility - displays router used to get to a specified Internet Host
- Operation
  - router sends ICMP Time Exceeded message to source if TTL is decremented to 0
  - if TTL starts at 5, source host will receive Time Exceeded message from router that is 5 hopes away
- Traceroute sends a series of probes with different TTL values… and records the source address of the ICMP Time Exceeded message for each
- Probes are formatted to that the destination host will send an ICMP Port Unreachable

Address Translation

- Map IP addresses into physical addresses (e.g., 48 bit IEEE)
- Address Resolution Protocol (ARP)
  - table of IP to physical address bindings
  - sender broadcasts request if destination IP address not in its table
  - target machine responds with its physical address

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How do Hosts/Routers Build/Maintain ARP Caches

- Table entries discarded if not refreshed (~10 minutes)
- Update your table with source when you are the target
- Update your table if you already have an entry and see info pass by on net
- Do not add new table entry based on info that passes on net