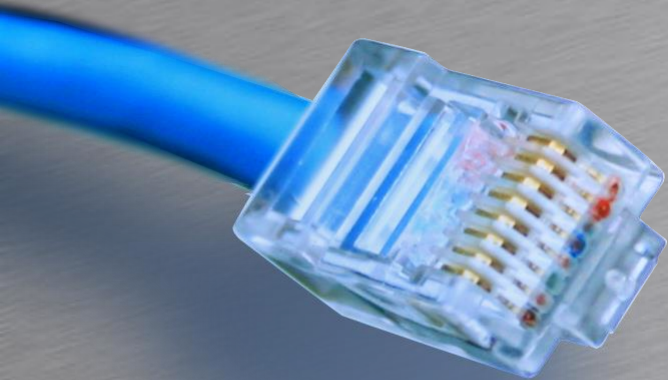


# IPT Netværk



HOUSE OF  
TECHNOLOGY



- en del af **mercantec<sup>+</sup>**

## IPT netværks protokoller

**TDC** IP telefoni Scale



# IPT Netværk Services

- IP telefoner skal bruge noget konfiguration for at virke på et netværk
- Stor arbejdsbyrde at taste alt informationen ind manuelt
- En masse arbejde for at skifte nummer/bruger/pladsering.
- Alt dette arbejde kan automatiseres med standard protokoller



# IPT Netværk Services

- For at en IP Telefon kan ringes til kræver den noget information
  - IP adresse
  - Tid
  - Bruger konfiguration
  - LAN Konfiguration
- Denne information gives af følgende protokoller
  - DHCP (RFC2131)
  - NTP (RFC1305)
  - TFTP (RFC1350)
  - CDP/LLDP-MED (IEEE 802.1AB)



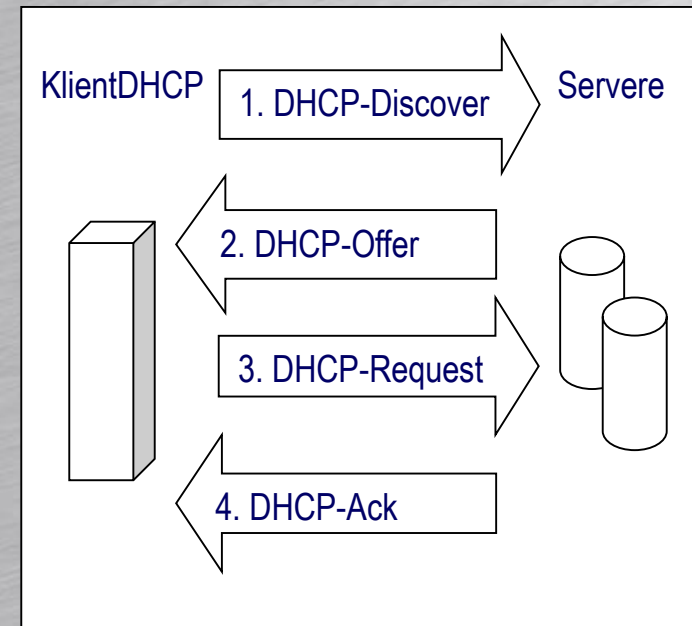
# DHCP

- En DHCP servers funktion er at styre og konfigurere TCP/IP opsætningen på computere/klienter som anmoder om det.
- DHCP serveren letter det administrative arbejde betydeligt, idet der ikke manuelt tildeles IP adresser mv.
- Desuden kan den samme adresse ikke lejes ud 2 gange på samme tid, dvs. at man ikke kan få adresse konflikt.
- En DHCP server kan konfigurere DHCP klienter med mange forskellige parametre som fx:
  - En IP adresse
  - Subnet maske
  - Gateway adresse
  - Adressen på en eller flere DNS servere
  - WINS servere,
  - proxy server osv.



# DHCP

- DHCP-Discover
  - Klient anmoder om konfiguration fra en DHCP-server
- DHCP-Offer
  - Servere tilbyder IP-adresse og øvrige standard opsætninger
- DHCP-Request
  - Klient vælger server og bekræfter de parametre serveren leverede
- DHCP-Ack
  - Serveren accepterer valget





# DHCP



- DHCP

## [-] Bootstrap Protocol

Message type: Boot Reply (2)

Hardware type: Ethernet (0x01)

Hardware address length: 6

Hops: 0

Transaction ID: 0xd828b025

Seconds elapsed: 0

[-] Bootp flags: 0x0000 (Unicast)

Client IP address: 0.0.0.0 (0.0.0.0)

Your (client) IP address: 10.197.1.101 (10.197.1.101)

Next server IP address: 0.0.0.0 (0.0.0.0)

Relay agent IP address: 0.0.0.0 (0.0.0.0)

Client MAC address: LnSritha\_a6:a9:17 (00:1a:7e:a6:a9:17)

Client hardware address padding: 00000000000000000000

Server host name not given

Boot file name not given

Magic cookie: DHCP

[-] Option: (53) DHCP Message Type

[-] Option: (54) DHCP Server Identifier

[-] Option: (51) IP Address Lease Time

[-] Option: (58) Renewal Time Value

[-] Option: (59) Rebinding Time Value

[-] Option: (1) Subnet Mask

[-] Option: (28) Broadcast Address

[-] Option: (3) Router

[-] Option: (6) Domain Name Server

[-] Option: (42) Network Time Protocol Servers

[-] Option: (66) TFTP Server Name

[-] Option: (150) TFTP Server Address



# NTP

- Manuel indtastning af tid på alt udstyr er også en arbejdstung opgave
- Hvordan sikrer man sig millisekunders præcision?
- Præcis til er meget vigtigt når man skal fejlfinde i logfiler.
- Network Time Protocol kan automatisere processen.
- RFC1305



# NTP

- Kan virke på 3 forskellige måder
  - Client: En vejs synkronisering mod en server
  - Symmetric: Peer synkronisering imellem 2 enheder
  - Broadcast: En NTP broadcast beskred indstiller uret på den lokale maskine (Sikkerhed!?)
- Bruger stratum niveauer for at definere præcision
  - Stratum 0 har en lokal tid. (Atom/GPS/Frk. Klokken)
  - Stratum 1 har synkroniseret med en st. 0
  - Stratum 2 har synkroniseret med en st.1
  - Osv...





# NTP



- NTP Pakke i wireshark

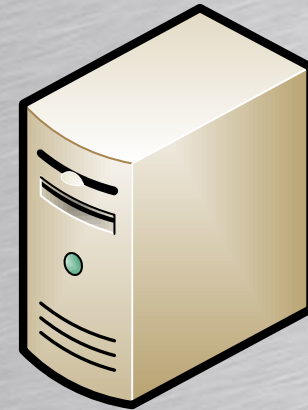
No.	Time	Source	Destination	Protocol	Length	Info
14	4.678	10.197.1.100	87.48.133.100	NTP	90	NTP Version 1, client
15	4.726	87.48.133.100	10.197.1.100	NTP	90	NTP Version 1, server

```
⊕ Internet Protocol Version 4, Src: 87.48.133.100 (87.48.133.100), Dst: 10.197.1.100
⊕ User Datagram Protocol, Src Port: ntp (123), Dst Port: 1024 (1024)
⊖ Network Time Protocol (NTP Version 1, server)
  ⊕ Flags: 0x0c
    Peer Clock Stratum: secondary reference (2)
    Peer Polling Interval: invalid (0)
    Peer Clock Precision: 0,000001 sec
    Root Delay: 0,0038 sec
    Root Dispersion: 0,0454 sec
    Reference ID: 192.66.185.7
    Reference Timestamp: Sep 15, 2014 13:36:17.971198000 UTC
    Origin Timestamp: Jan 1, 1970 00:00:00.000000000 UTC
    Receive Timestamp: Sep 15, 2014 13:50:43.074099000 UTC
    Transmit Timestamp: Sep 15, 2014 13:50:43.074110000 UTC
```



# TFTP

- Trivial File Transfer Protocol
- Simpel fil overførsels protokol (som navnet antyder)
- Kan implementeres med minimal kode da den er stateless.
  - Read request: file.config
  - Data Packet, Block 1
  - ACK, Block 1
  - Data Packet, Block 2
  - ACK, Block 2







# TFTP

- Konfigurations fil

```
[VOIP]
max_line_num 1
preferred_codec pcma pcmu g729
message_url 403
[LAN]
network_mode DHCP
tftp_server_address 87.48.133.100
[DSP]
ringer_off on
headset_mode disable
[SYSTEM]
lang 3
lock_outgoing_call 0
[VOIP]
line1_proxy_address vk102113.hvoip.dk
line1_proxy_port 5060
line1_displayname "Viborg 403"
line1_name mercantec403
line1_authname mercantec403@vk102113.hvoip.dk
line1_password 0R9APLug03
line1_type private
[PROG]
add 2 2
label 2 ""
add 3 1
```



# CDP

- Cisco Discovery Protocol (Proprietær)
- Lag 2 protokol til at finde naboer
- Aktiveret som default på alt Cisco udstyr
- Sender information omkring enheden til naboerne
  - Navn
  - Funktioner (Switch, router, bridge, host)
  - Strøm
  - Software
  - Adresser
  - Afsender port



# CDP

- CDP i Wireshark

Filter: **cdp** Expression... C

No.	Time	Source	Destination	Protocol
1	0.000	LnSriitha_ab:63:20	CDP/VTP/DTP/PAgP/ICDP	
2	0.254	LnSriitha_ab:63:20	CDP/VTP/DTP/PAgP/ICDP	

<

⊕ Frame 1: 118 bytes on wire (944 bits), 118 bytes captured

⊕ IEEE 802.3 Ethernet

⊕ Logical-Link Control

⊖ Cisco Discovery Protocol

- Version: 2
- TTL: 180 seconds
- ⊕ Checksum: 0x2fa5 [correct]
- ⊕ Device ID: LN001A7EAB6320
- ⊕ Port ID: port 1
- ⊕ Capabilities
- ⊕ Software Version
- ⊕ Platform: LG-Ericsson LIP 8830
- ⊕ VoIP VLAN Query: 512
- ⊕ Power Consumption: 6300 mW



# LLDP

- Link Layer Discovery Protocol
  - IEEE 802.1AB
  - LLDP Media Endpoint Discovery (LLDP-MED)
- Cisco switche understøtter følgende TLV'er (type/length/values)
  - Port description TLV
  - System name TLV
  - System description TLV
  - System capabilities TLV
  - Management address TLV
  - Og andre...



# LLDP

- LLDP i Wireshark

Filter: **lldp** Expression... Clear Apply Save

No.	Time	Source	Destination	Protocol	Length	Info
902	19.86	Lg-Erics_c4:4b:a0	LLDP_Multicast	LLDP	264	Chassis
924	25.30	Cisco_5e:a5:91	LLDP_Multicast	LLDP	518	Chassis
1011	40.52	Lg-Erics_c4:4b:a0	LLDP_Multicast	LLDP	264	Chassis

<

⊕ Frame 902: 264 bytes on wire (2112 bits), 264 bytes captured (2112 bits) on interface 0

⊕ Ethernet II, Src: Lg-Erics\_c4:4b:a0 (b4:0e:dc:c4:4b:a0), Dst: LLDP\_Multicast (01:00:00:00:00:00)

⊖ Link Layer Discovery Protocol

- ⊕ Chassis Subtype = Network address
- ⊕ Port Subtype = MAC address
- ⊕ Time To Live = 120 sec
- ⊕ Port Description = LG-Ericsson IP Phone
- ⊕ System Name = LG-Ericsson IP8815E
- ⊕ System Description = LG-Ericsson IP8815E; 1.0; 1.0.32sbt\_c; 1.1.9
- ⊕ Capabilities
  - ⊕ Management Address
    - ⊕ TIA TR-41 Committee - Media Capabilities
    - ⊕ TIA TR-41 Committee - Network Policy
    - ⊕ TIA TR-41 Committee - Extended Power-via-MDI
    - ⊕ TIA TR-41 Committee - Inventory - Hardware Revision
    - ⊕ TIA TR-41 Committee - Inventory - Firmware Revision
    - ⊕ TIA TR-41 Committee - Inventory - Software Revision
    - ⊕ TIA TR-41 Committee - Inventory - Serial Number
    - ⊕ TIA TR-41 Committee - Inventory - Manufacturer Name
    - ⊕ TIA TR-41 Committee - Inventory - Model Name
  - ⊕ End of LLDPDU