

→ The OSI Model in 1977

"open sys interconnection"

→ seven layers of OSI model :-

application

presentation

session

transport

network

data link

physical

advantages :

① one big task divided into small tasks

② each layer handles specific subtasks of tasks.

→ How layers can communicate?

Vertical communication & Horizontal Communication

→ intermediate node :-

local area network

individual connections Vs LAN connection

شبكة محلية vs شبكة واسعة النطاق

لانه يتطلب address لمجموعة كبيرة من الأجهزة

"NIC"

network interface card // كارت شبكة

implemental - Tcpip stack

كل شبكة أجهزة اتصال

→ inter networking devices

Switch رئيسي

طالع في Cable

مشترك على راوتر

راوتر internet service Provider

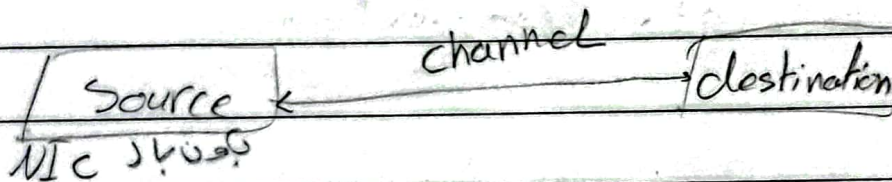
شبكة في شبكة

الراوتر يربط شبكات مختلفة يعني كل جامعة هي شبكة مختلفة
مبنية على الراوتر

→ switches: "أوتسبيل أجهزة"
→ Routers: تشبك شبكات مع بعض

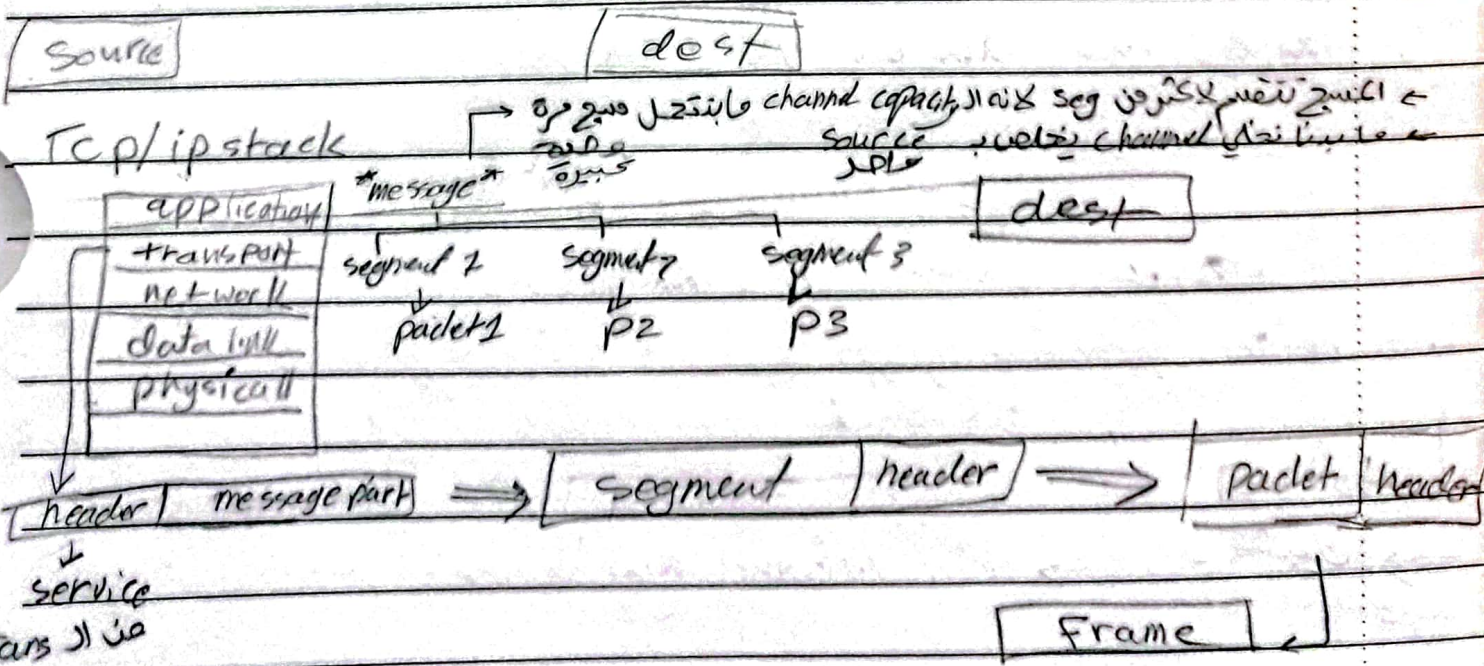
* switch → turns on layer 2 → "Data Link"
* Router → [network layer]

2022-2023
"شبكة 2"



upload speed → أقل من download speed

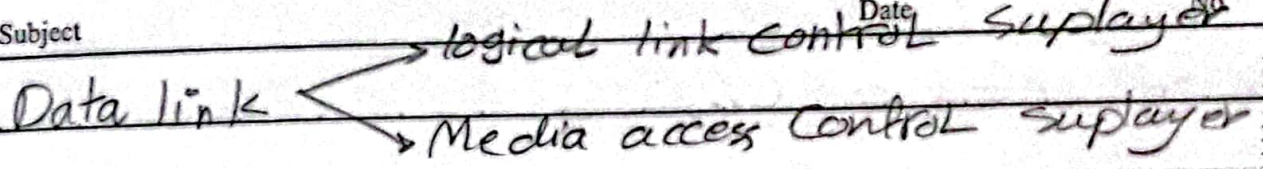
* الموصل: بجوهر من ديجيتال أو analog، كالكابل
→ على مستوى الجامعة: local area



Subject

Date

Suplayer



* every NIC has Mac address not able to change it's from manufacture

* Mac address → switches

* اذا بدى الاجن امتي باستخدام switch فقط قبالها داخل الجامعة

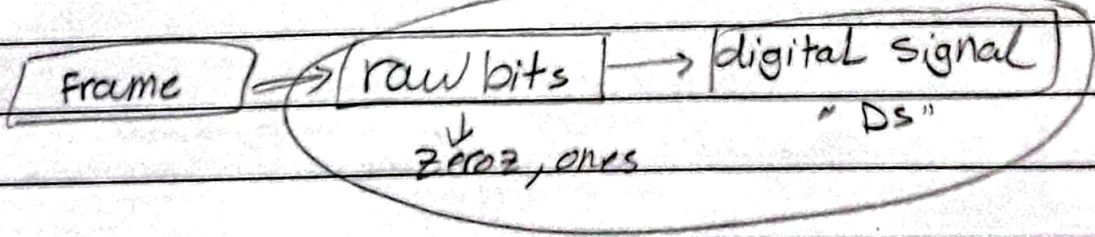
* local : router → interface

* regional : local

* global : regionals

VIP

كيف به يعرف ان local switch [mac address source & dest] address واد port numb switching table



Header → ip address source , ip address destination.

→ router : رقم ال تنويرك لا يسير

[port: switch] / interface: router

→ advantages : router & switches → cables

applicier : لو كان فيه noise بالمخال هو كبر القاع و هوود السويوز

repeater : يسهل ال noise و يقوي ال signal

→ Transport layer ⇒ end to end layer
⇒ Host to host

→ ~~data link layer~~ ⇒ point to point
hop to hop

link LLC
logical layer
مستوية عن قلوب اند ايرو كونترول
حويودة بالذات لينك والترانسبور

[Point to point] ^{سؤال}
كلتا الطرفين (device) على "check" في ال error بسبب noise

"one packet at the time" ← device ← buffer ←

error → damage
→ lost

[load balancing]

"error" ← Transport layer

Financial document
Transport layer [unreliable and | reliable
[UDP] | [TCP]
user program
protocol

سؤال [3-15]

switches ← data link
routers ← network
* to avoid direct links *
impossible to happen

delay ← disadvantages for routers and switches
delay ← hops

→ application layer = allowed end user to use network resources
تفويض الموارد

→ session layer: connection b/w source and destination.

application layer → Msg / Transport layer → Segment

network layer → packet / Data link → Frame

physical → Bit

→ addressing → mac address "source, dist" data layer link
→ ip address "source" network layer
"distin"

→ application layer → URL address → specific addresses

→ Transport → port address: server program → موجود في Server high speeds

كل سرور وكل كونا له سيرفر يقبل الـ request من الـ Client ويجاوبه.

كل جهازين في سيرفر / كل ركيوست يبي عن الـ Client يكون على port number address

في احيان يكون عندي سيرفر فاستين افعال اخرين في سيرفر بروجرام

→ physical addresses → bit 48 → وهي ثابتة

→ fixed mac address الـ NIC الـ fixed mac address يكون من جزئين، جزء هو الـ address والـ other

→ transmission media → unguided / Coaxial cable → either net
→ guided

Fiber → Single MF → used for long distances
 Fiber → multi MF → " " short

OM1, OM2 : cladding size, core size | OM1: 62.5/125 μm
 OM2: 50/125
 [cores/cladding]
 نام من اصعب ل 4 اصعب

→ Fiber OM3, OM4 ranging from 10 gigabit to 100 gigabit
 → 100G port types = (A) 100GBASE-CR10 → 10 plus → كل مسافة 10
 → 100G port-CR4 : [Copper 10 meter] 100 = 2 و 1 و 1 و 1
 → short range → multi mode / long range, extra long → single mode
 → 100 meter → use to connect switches bec it is short.

OM4 → 150 m → MMF

OM3, OM4 wave link = 850 nm → long = 10 km

→ long range - LR4 : w.l = 1310 nm. كل ما كان أقل w.l أقل
 Extra - ER4 : " = 1550 nm. كل ما كان distance قليلة.
 → 40 km routers يكون بين ال

→ 40 G port : (A) 40GBASE-CR4 : "copper: 10 m"

(B) 40GBASE-SR4 : short = 100 m, OM3 / OM4 = 150 m / w.l = 850 nm

→ 40GBASE-ER : for single mode fiber (10 km) it use 1550 nm

→ 40 " - T : switch بين ال switch → ال switch
 ال switch ال switch ال switch
 ال switch ال switch ال switch

→ digital transmission : base band / analog : broad band

→ digit better than analog.

→ amplifier : ال switch ال switch ال switch
 Noise ال Noise
 rebuffer: without progress the noise

data link layer

31-3 2018

- ① logical link control sublayer
- ② media access control sublayer

→ data link services :-

- ① Encapsulation packets into Frames
- ② frame synchronization (done by media access)
- ③ [LLC] sublayer
 - Ⓐ error control
 - Ⓑ flow control

error control : ① detection technique → negative acknowledgment

② positive acknowledgment → correct then send me next frame

③ retransmission

④ time out

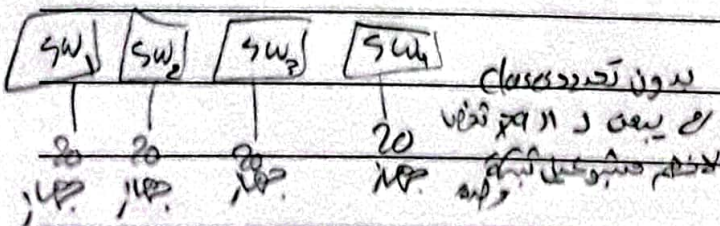
Sender side timer :- "positive acknowledgment" Frame received then I make forwarding for it

"timer" → "ack" → Frame received then I make forwarding for it

→ (MAC) sublayer :- channel access protocol

CSMA/CD protocol collision detection

- ② data packet queuing or scheduling
- ③ store and forward switching : From come on switch then I make forwarding for it or (cut through switching)
- ④ [QoS]
- ⑤ virtual LANs : Network divided into groups



بدون تصدیب کلاس
و بعد از آن تصدیب کلاس
لازم می شود
مع کلاس A, B, C, D
در بعد از آن تصدیب کلاس A

"DHCP"

Subject

+ Dynamic Host configuration protocol (DHCP)

→ application layer protocol

3 - April

+ address resolution protocol "ARP"

ARP used to convert IP address to physical address.

→ port address on transport layer

device ip address and corresponding mac address

→ ARP: tuple with ip add's and corresponding mac address

⇒ "HDLC" protocol :-

OSI model is used in ethernet and HDLC

unreliable protocol network data is transfered Hand shaking is done

→ UDP: Consider about time: vid streaming / video

→ TCP: accurate data transfer

hand shaking is done, 200 bits

→ LLC → Asynchronous balanced mode → flow & error control

communicating with internet service provider:

→ SLIP: manual configuration & accuracy

→ PPP: auto configuration & reliability

Frame :- end - stat

→ fixed length : necessary to identify the start of frame.

→ variable :- synchronization

→ Frame synchronize :

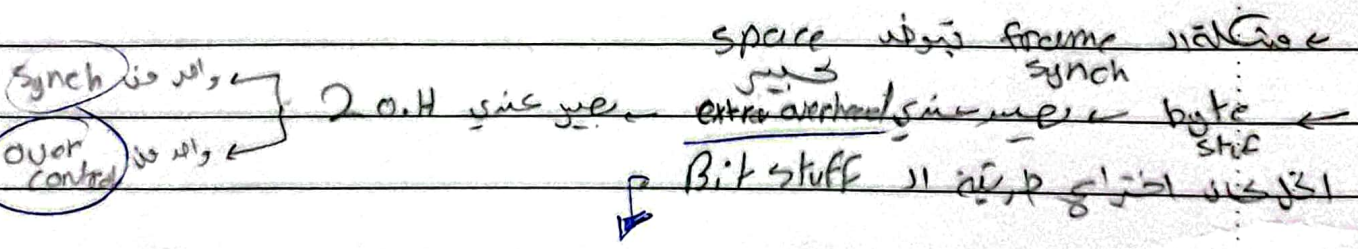
① character count :- disadvantage : if count is garbled by a transmission error the destination will lose synchronization & unable to locate start of next frame.

② byte stuffing - "asci-one byte" ⇒ Triple 'B' → Point to point

→ Flag on start frame and it's end.

Flag on start frame and it's end. (Note: This block contains some handwritten notes and a small diagram related to flag placement.)

② content scale



Bit stuffing: Flag: 0 11 1110 ⇒ HDLC

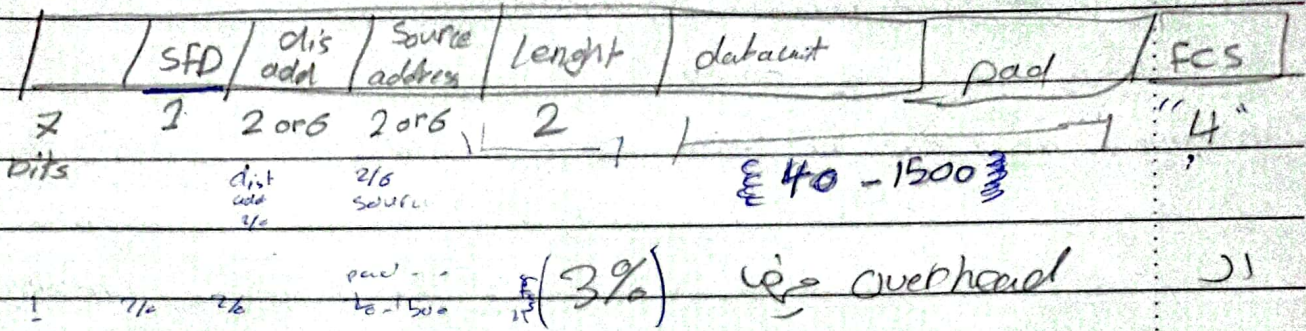
Example :-

char count: 0000100

byte stuff: A B Esc Flag

bit stuff ⇒ 5 ones

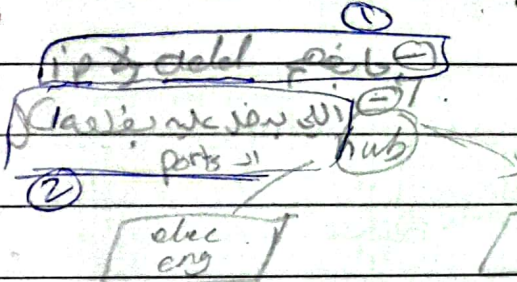
frame format : length is number of data bytes



Interworking devices.

7-April

• diff ports all in repeaters i.e. Hub 1



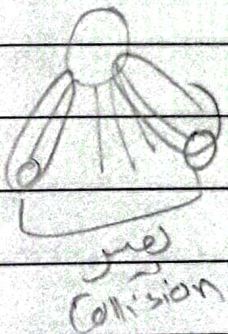
• domain isolation
"2 layer" layer one device: Hub
[it act like bus]

Single collision domain

quested in this -
table regeneration 1, 4

[capacity speed] Hub is same as other devices

⇒ Bridges :- first device understand mac address
now 3 collision domains.



* Bridges modes of operation:

→ filtering: sender & receiver on same signal

→ forwarding: " " on different signals

→ flooding: if it does not know where the destination host is

bridge initially floods (address table)

10-April

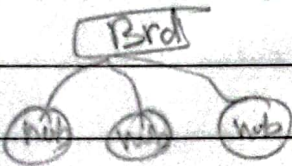
different btw star & bus?

أكثر من نقطة اتصال / segments

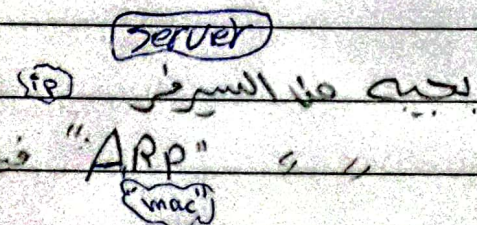
hubs: same speed, one layer device, buffer capability

* bridges: Layer 2 devices

3 collisions, one big collision, single domain

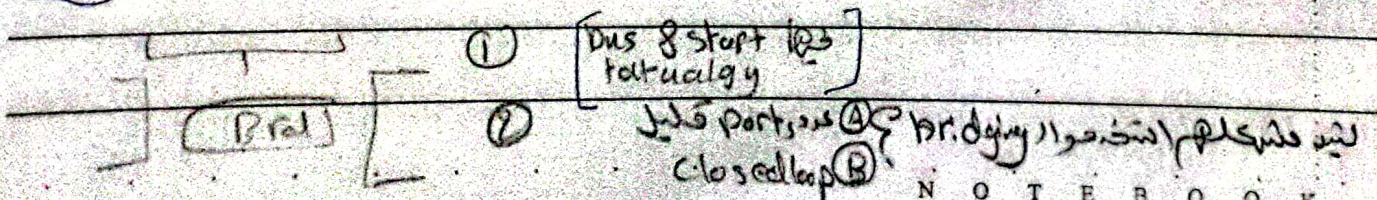


* IP address for destination



⇒ closed loops:

ports start taking... ethernet



either net "layer 2" switching

→ no collisions, fast net, giga bit ethernet

→ old ethernet = collisions

→ bridge ⇒ old eth net

⇒ store & forward Vs (cut through switch)

لقد عرفنا "mac add (s,d)" بعد ارجوعنا الى حزمة البيانات اذا كان ال switch في حاله

⇒ Routers ⇒ layer 3 devices

اذا كانت الشبكة قائمة على التوجيه router [قائمة: ring & bus & star]

⇒ gateway ⇒ في حال كانت قائمة على التوجيه

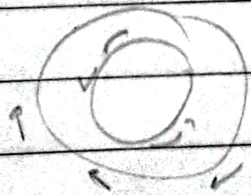
تصادم ⇒ Collision :- taken ring opr يكون غير صحيح اذا لم يتم ازالة الحزمة من الحلقة اذا لم يتم ازالة الحزمة من الحلقة اي جهاز تابع في الاختلال في حاله collision

Token ring (15Mbps) جدول التوجيه

⇒ ether (10) كل ال collision موجود

(advanced)

عشان اذا كان في rings 11 و 12 و 13 و 14 و 15 و 16 و 17 و 18 و 19 و 20 و 21 و 22 و 23 و 24 و 25 و 26 و 27 و 28 و 29 و 30 و 31 و 32 و 33 و 34 و 35 و 36 و 37 و 38 و 39 و 40 و 41 و 42 و 43 و 44 و 45 و 46 و 47 و 48 و 49 و 50 و 51 و 52 و 53 و 54 و 55 و 56 و 57 و 58 و 59 و 60 و 61 و 62 و 63 و 64 و 65 و 66 و 67 و 68 و 69 و 70 و 71 و 72 و 73 و 74 و 75 و 76 و 77 و 78 و 79 و 80 و 81 و 82 و 83 و 84 و 85 و 86 و 87 و 88 و 89 و 90 و 91 و 92 و 93 و 94 و 95 و 96 و 97 و 98 و 99 و 100



في حاله fiber
down
في حاله collision

fastnet ⇒ ethernet في حاله collision

networks

sondos abu idag

2022