2015

1. (a)

- WLAN's are by definition local area networks which are wireless, such as Wifi or Ad-Hoc
- WLAN's signals can be picked up by anyone within the networks range and so are commonly protected with username's and/or passwords to restrict access
- ADV- less cables needed so therefor time saving for setup and cost saving for expensive wiring/setup personnel
- DIS- Much easier to hack into than regular LAN and you may need to purchase extra wireless devices to expand range if needed
- CSMA/CA – checks channels to determine whether they are free or not in order to avoid collisions during packet sending on the network. If a channel is not free then the node trying to send the packet will randomly generate an amount of time to wait before trying again, and this will repeat until the channel is free
- Worst case transmission time – this is known in advance, meaning that RTS and CTS messages can be used to reserve time for the transition of data, and other station which hear the messages know to keep quiet for the duration of the data frame
- Stat-boys to remember: frequency band = 2.4GHz, max data rate = 2MB/s, typical range = 10m

(b)(i)

- Ad-hoc/BSS

(ii)

- ESS/multi BSS

(c)(i)

- The simplest way of achieving the above scenario would be using an Ad-hoc mobile style network as this is designed specifically for peer to peer operation

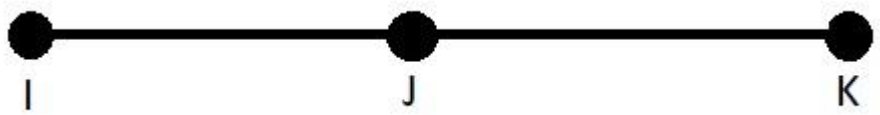
- The network would use CSMA/CA to avoid packet sending collisions
- At this stage the network would require no base station, however when making the improvement to the network to allow residents internet connection, a base station will be required – which could be controlled by a member of staff
- The new implementation would be in the form of an ESS (extended service set)
- The base station (or managers ipad/device in this case) would act as an access point to a distribution system, which would manage residents internet access

(ii)

- If the network is not restricted in some way then some social and ethical issues may arise
- Topics such as politics or religion amongst others could spark debates and even cause offense to some individuals, as well as some people's opinions potentially being politically incorrect
- Videos and media shared across the network can also have the same effect as this, with certain users finding things more offensive than others do, and wish for some media to be censored for their viewing
- Given that in this scenario the users disability may differ greatly from person to person I would assume that the sensitivity levels of residents would also range from extremely sensitive to not sensitive – in which case it may be a good idea to put restrictions on websites and media accessed as well as monitoring the residents chats to avoid sensitive subjects being spoke about
- A way to avoid complaints about restrictions may be to give control of restricted sites to a manger, who could allow access to a certain site if a user makes a request to access a site which the manager deems as appropriate for use

2. (a)

- If router J lies on the optimal path from router I to router K, then the optimal path for J to K also lies along the same route



(b)

- The idea behind link state routing is fairly simple and can be stated as 5 parts. Each router must do the following to make it work:

    1. Discover its neighbours and learn their addresses
    2. Set the distance or cost metric for each of its neighbours
    3. Construct a packet containing information about what it had just learned
    4. Send this packet to and receive packets from all other routers
    5. Compute the shortest path to every other router

- In effect the complete topology is distributed to every router
- Then Dijkstra's algorithm can be ran at each router to find the shortest path to each of the other routers

(c)(i)

sequence no.	
age	
B	6
D	6

sequence no.	
age	
A	4
C	1
D	6
F	7

- Above are diagrams for node A (left hand side) and node B (right hand side)
- Below are diagrams for node C (left hand side) and node D (right hand side)

sequence no.	
age	
B	1
F	4

sequence no.	
age	
A	18
B	6
E	4
F	12

- Finally below are diagrams for node E (left hand side) and node F (right hand side)

sequence no.	
age	
D	10
F	4

sequence no.	
age	
B	9
C	16
D	14
E	10

(ii)

sequence no.	
age	
B	10
D	24

sequence no.	
age	
A	10
C	2
D	12
F	16

- Above are diagrams for node A (left hand side) and node B (right hand side)

- Below are diagrams for node C (left hand side) and node D (right hand side)

sequence no.	
age	
B	2
F	20

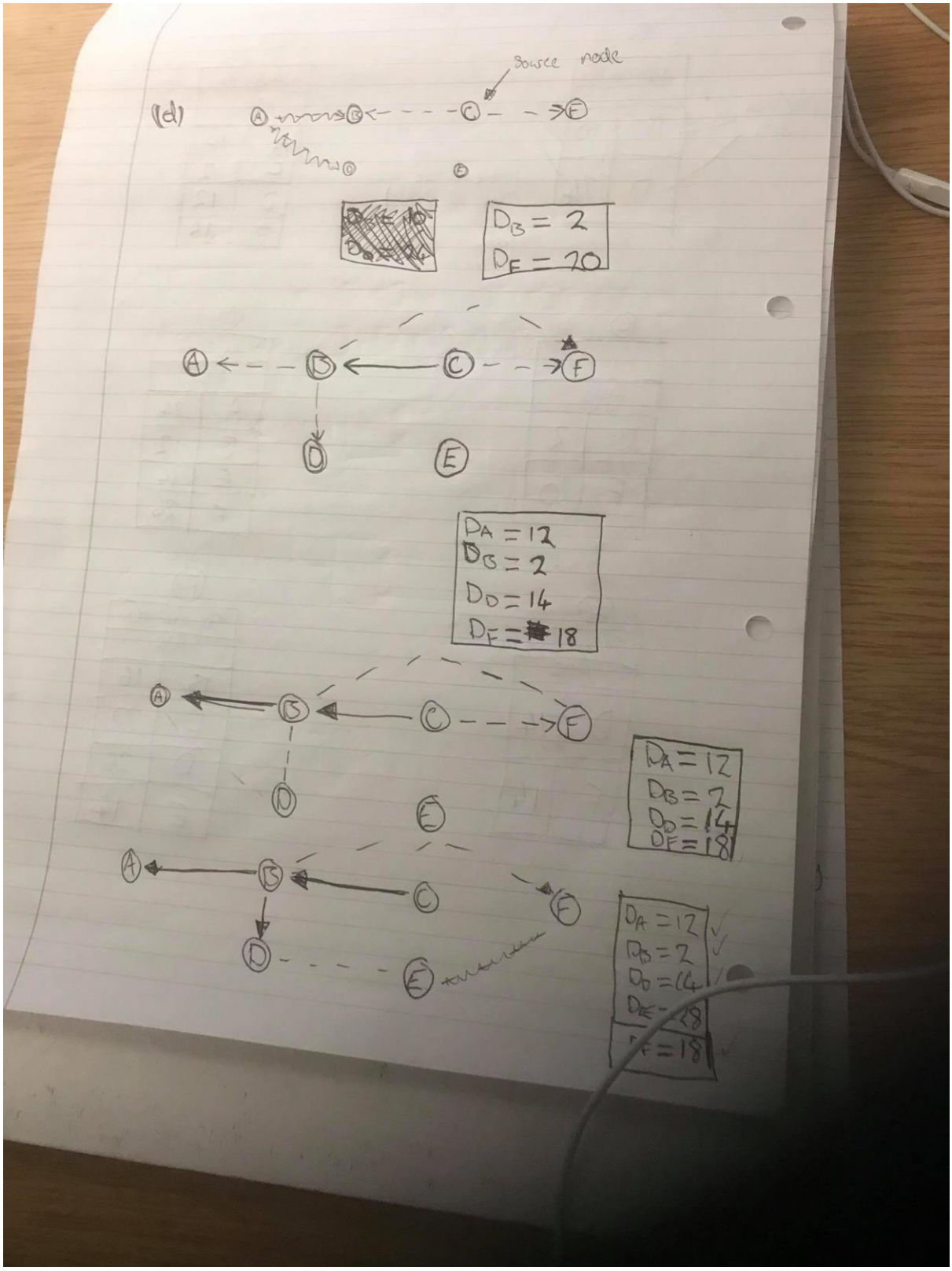
sequence no.	
age	
A	24
B	12
E	14
F	26

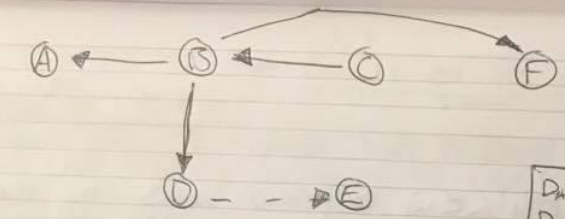
- Finally below are diagrams for node E (left hand side) and node F (right hand side)

sequence no.	
age	
D	14
F	14

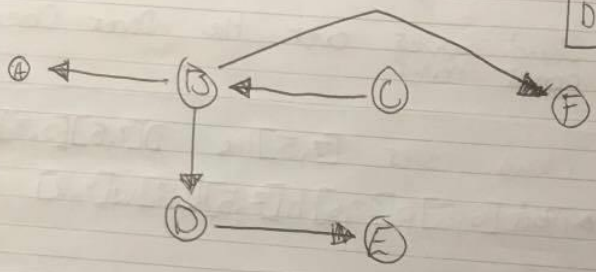
sequence no.	
age	
B	16
C	20
D	26
E	14

(d)


source node
(d)
A
B
C
F
D
E
$D_B = 2$
$D_F = 20$
$D_A = 12$
$D_B = 2$
$D_D = 14$
$D_F = 18$
$D_A = 12$
$D_B = 2$
$D_D = 14$
$D_F = 18$
$D_A = 12$
$D_B = 2$
$D_D = 14$
$D_F = 18$



$D_A = 12$
$D_B = 2$
$D_D = 14$
$D_E = 28$
$D_F = 18$



ans:

Iteration	M	D_A	Path	D_B	Path	D_D	Path	D_E	Path	D_F	Path
1	[C]	∞	-	2	C-B	∞	-	∞	-	20	C-F
2	[B,C]	12	C-B-A	2	C-B	14	C-B-D	∞	-	18	C-B-F
3	[A,B,C]	12	C-B-A	2	C-B	14	C-B-D	∞	-	18	C-B-F
4	[A,B,C,D]	12	C-B-A	2	C-B	14	C-B-D	28	C-B-D-E	18	C-B-F
5	[A,B,C,D,F]	12	C-B-A	2	C-B	14	C-B-D	28	C-B-D-E	18	C-B-F
6	[A,B,C,D,E,F]	12	C-B-A	2	C-B	14	C-B-D	28	C-B-D-E	18	C-B-F