MODULE E NETWORKS · E2

What affects network performance: mark scheme

20 marks · OCR J277 spec 1.3.1 (factors that affect the performance of networks; apply to a given scenario)

How to use. 1 mark per bullet up to the maximum shown. **/** separates alternative answers. Words in (brackets) are not needed for the mark. Credit any other valid answer that shows the same understanding. Throughout: "it's faster" / "it's slower" alone is not enough (NE); the answer must say what is affected and why.

QUESTION	ANSWER	MARKS	GUIDANCE
1(a) J277 1.3.1 Bandwidth	The amount of data that can be transferred / sent (over a network / connection) in a given time / per second	**1**	Must refer to amount of data **and** time. Do not accept "the speed of the internet" alone.
1(b) J277 1.3.1 Bandwidth	Mbps / megabits per second / bps / kbps / Gbps	**1**	Accept any bits-per-second unit. Do not accept MB, GB or any unit with no time element.
2(a) J277 1.3.1 Number of devices; transmission media; traffic	Twenty more devices: Reduce Fibre optic replaces copper: Improve Further away, behind a wall: Reduce Downloads moved overnight: Improve	**4**	1 mark per correct row. 2 ticks in a row = 0 for that row.
3(a) J277 1.3.1 Bandwidth; number of devices	200 ÷ 40 = 5 (Mbps)	**1**	Correct answer with no working: award the mark.
3(b) J277 1.3.1 Bandwidth; number of devices	200 ÷ 50 = 4 (Mbps)	**1**	Do not accept 200 ÷ 10 = 20.
3(c) J277 1.3.1 Number of devices	The (same) bandwidth is shared between more devices so each device gets less bandwidth / can send or receive less data per second More devices create more traffic / more data on the network so data has to wait / more collisions / data takes longer to arrive	**2**	1 mark per bullet, max 2. "The network is slower" alone = NE.

QUESTION	ANSWER	MARKS	GUIDANCE
4(a) J277 1.3.1 Factors affecting performance (wireless signal); apply to a scenario	Distance: the desk is far from the wireless access point… …so the signal is weaker / less data reaches the laptop per second Walls / obstacles: the two brick walls block / weaken the wireless signal… …so data is lost / has to be resent / signal is weaker Interference: the microwave (oven) interferes with the wireless signal… …causing errors / lost data that must be resent / dropped connection Other devices share the wireless network / bandwidth… …so less bandwidth is available to the laptop	**4**	2 marks per reason: 1 for the factor linked to the scenario, 1 for the explanation. Max 2 reasons. Credit any other valid reason (e.g. other nearby wireless networks interfering). Do not accept "the Wi-Fi is bad" alone.
5(a) J277 1.3.1 Transmission media; apply to a scenario	Wired connections usually have a higher bandwidth (than wireless) / fibre optic has a very high bandwidth so more data can be transferred per second / large video files copy to the server in less time Wired connections are more reliable / not affected by walls, distance or interference so fewer errors / less data is lost or resent Computers no longer share the wireless bandwidth / less traffic on the wireless network	**3**	1 mark per bullet, max 3. "Faster" alone = NE: must say what is faster (e.g. copying files) or why. Do not accept "wired is more secure" (not a performance factor).
6(a) J277 1.3.1 Traffic; hardware; apply to a scenario	**Either:** schedule the backups for a quieter time / overnight / stagger them at different times (1) …so less traffic / data is sent at lunchtime / backups no longer use up the bandwidth (1) …so other data does not have to wait / fewer delays for staff (1) **Or:** replace the switch with a higher-specification switch (1) …that can handle more data / more requests at the same time (1) …so it is no longer a bottleneck / data does not queue (1) **Or:** increase the bandwidth / upgrade the cables, e.g. to fibre optic (1) …so more data can be transferred per second (1) …so backups and other traffic are not slowed as much (1)	**3**	1 mark for a valid change linked to the scenario, up to 2 for explaining why it helps. Mark the first change only. Credit any other valid change (e.g. fewer devices connected at noon).

Total: 20 marks