

Tackling the Technology Gender Gap Together: Networking – Communicating our Future

Level - Third Level

Subject area/s – Computing Science



Networking: Communicating our future

Level - S1/2/3

Subject area/s – Technologies(Computing Science)

Experiences and Outcomes –

Technologies(Computing Science)

I understand how information is stored and **how key components of computing technology connect and interact through networks** TCH 2-14b

Benchmarks –

Computing Science : Understanding and analysing computing technology

Demonstrates an understanding of how networks are connected and used to communicate and share information, for example the internet. TCH 2-14b

Duration of time – 7 x 50/55min

Lesson 1	Slides 1-12
Lesson 2	Slides 13- 18 (possibly starting on 19: Hybrid design)
Lesson 3/4/5	Slide 19 -20
Lesson 6	Slide 21-22
Lesson 7	Slide 23-25

Computing Science Concepts and Approaches

Computational Thinking : Finding the most efficient way to solve a problem; the best solution provides the fastest correct method, using the least amount of resources.

Communication and coordination : A network is a set of computers connected to share data and resources.

Collaboration: requires us to explain our logical reasoning behind our work. Working with others to solve a problem gives opportunities to develop personal, social and emotional skills, self confidence, make relationships and manage feelings and behaviour.

Outline of Rubric for assessment of Computing Science Experiences and Outcomes

Uses technical language TCH 2-14b Workstation Server Topology Channel Router * Devices*	Uses terms in context	Uses some terms	Limited use of key terms
Creativity Evidence of computational thinking	Design of network shows originality and creativity	Design uses topologies in a simple design layout	Design shows limited use of topologies (Max 2)
Demonstrates understanding of networks 2-14b	Shows a full understanding of the topic	Shows a good understanding of the topic	Shows an understanding of the topic
Presentation/sharing with others LIT	Voice loud enough and speaks clearly	Voice loud enough but unclear from time to time	Voice loud enough but difficult to understand

Overview of learning

Pupils will be introduced to the impact that networks have in our lives. Starting by looking at existing networks, or what connects us, we move forward to look at Computing networks and methods of communication.

Activities allow pupils to visualise the connections and the complications that exist in networks, as well as creating their own networks using existing topologies.

They will then look to the future with the most recent research into the use of networks.

This can be easily adapted to enable pupils to collaborate on a network design if required.

Pupil Objectives

- I can explain what a network is
- I can explain what a computer network is, using correct terms
- I can identify networks that I use (family, telephone, roads)
- I can name the layout/topologies used in computer network design
- I can create a hybrid network of my own design

Teaching Notes

In this pack you will find a presentation titled 'Networks'.
This gives you the step by step lesson plans for this topic

Resources required

Task	Material
Teaching notes	Presentation
Assessment	Rubric
Design a network	A3 sheets/pencil/ruler
Create a network	A3 sheet from design Large BBQ mallow (1 server) Mini mallows (many workstations) Kebab sticks/cocktail sticks Scissors Sticky tape/glue
Class fully connected network	Odd balls of Wool(different colour for each pupil) Large space
The future of networks	Document with links

Introduction

Pupils should be introduced to the current network that they use which are non-computer based

Some networks that we have already are

- Friends
- Roads
- Transport

These networks allow us to share aspects of their connection.

Friends network allow us to share in activities we have in common; sports, days out, music etc

Roads networks connect places together so that we do not have to find our own ways to places

Transport network provides us with a form of travel to connect us with places we want to go

Main Activity

Computer networks follow similar models to that of other networks using 3 main designs/layouts called topologies.

These three topologies should be the focus of the learning, highlighting the advantages and disadvantages of each. (Through questioning, an opportunity exists to allow pupils to identify the advantages/disadvantages)

Notetaking is optional

Having looked at the topologies, introduce the idea that 'hybrid' topologies exist explaining why they exist/how they have come about as well as the advantages and disadvantages.

Pupils will design their own 'hybrid' on paper. In this activity pupils will demonstrate their understanding of the topologies, demonstrate problem solving if/when they find that a 'connection' won't hold and reasoning as they explain why they have chosen the 'hybrid' design.

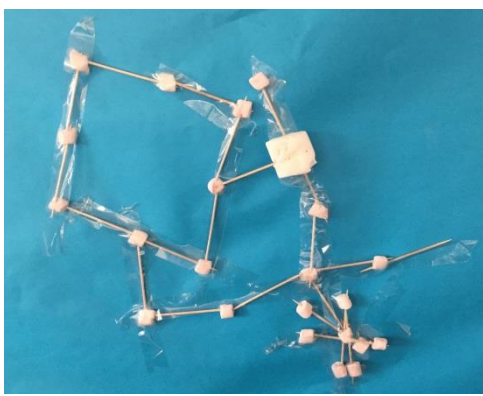
Once the design is in place then the practical construction of the network starts by using a large BBQ marshmallows as the server and mini marshmallows as the devices/workstations with cocktail sticks and kebab sticks as the communication lines.



A bus topology with a number of stars off shoots



A complex star, bus and ring



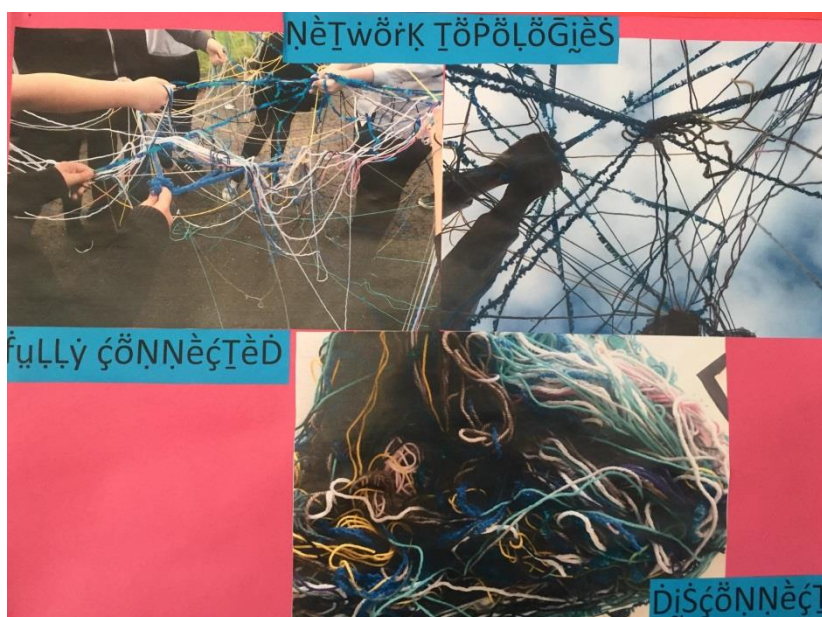
A bus with a ring and 3D star!

Plenary

Pupils should be able to display their designs and explain, using appropriate terms, the network they have created, sharing with each other their ideas and perhaps outlining why they created the design.

As a class/group, actively make a fully connected network.

- Each pupil should have a different colour of wool/string.
- Cut lengths of the wool/string – enough for each person in the class/group.
- Taking turns, each pupil should collect a length of wool/string from every other pupil whilst still holding on to the ends of all their own coloured lengths.
- As the number of connections made increases, the difficulties of identifying connections should one be dropped and sharing connections becomes apparent.



In addition, pupils have the opportunity to look at the most recent research and development taking place in and around networking via BBC Click short videos.

Differentiation

These activities tend to be differentiated by the pupils as they demonstrate their understanding and practical skills through the network they design and create.

Extension: pupils have the opportunity to look at the most recent research and development taking place in and around networking via BBC Click short videos.

Title	Link	Duration	Outline
How smart devices can give you a connected home	http://bbc.in/1KjJ1xp	3 min	Controlling your homes security, lighting heating with smartphone technology
How Wi-Fi can identify and track people through walls	http://bbc.in/1PL2OeA	2 min	Researchers at MIT Computer Science and Artificial Intelligence Lab have created a system that can identify people through walls

			using just Wi-Fi signals.
Could LiFi be the new WiFi	http://bbc.in/1M6lFdn	2 min	Professor Harald Haas coined the term Li-Fi in 2011. The technology uses ordinary LED room lights to transmit data around the house.

Further activities are available via the Computer Science Unplugged Muddy City (Materials available in this pack))

Assessment Opportunities

Pupils peer assess and give feedback using the rubric, Rubrics come in three form – points based, positive (growth) language and smileys. Three rubrics have been developed to allow teachers to use the most appropriate format for their teaching. All use the same criteria but the method of scoring is different.

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- Points based is useful if you wish a final total
- Positive (growth) language version allows staff to use the language of Growth Mindset to develop the learning of pupils.
- Smileys are available to support the AifL environment

Assessment opportunities are available to use this as a Literacy task in addition to the Computer Science content

Literacy		
Finding and using information (Listening & Talking)	LIT 2-05a	As I listen or watch, I can make notes, organise these under suitable headings and use these to understand ideas and information and create new texts, using my own words as appropriate.
	LIT 3-05a	As I listen or watch, I can make notes and organise these to develop thinking, help retain and recall information, explore issues and create new texts, using my own words as appropriate.
Finding and using information (Listening & Talking)	LIT 2-06a	I can select ideas and relevant information, organise these in an appropriate way for my purpose and use suitable vocabulary for my audience.
Tools for listening and talking	LIT 2-02a	When I engage with others, I can respond in ways appropriate to my role, show that I value others' contributions and use these to build on thinking.

(Networks Literacy Rubric available in this pack)

Curriculum Links

This unit could provide evidence for the Literacy outcome using available assessment materials