



# THEME INFORMATION 2022

# NETWORKS

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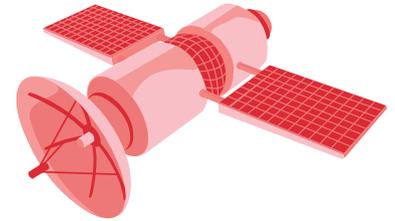
“ We are now all connected by the internet, like neurons in a giant brain.”

Stephen Hawking

## What is a network?

A network is a group of things connected in some way.

The connected things could be physical, like train stations or computers or neurons in a brain, or they might be ideas or feelings or other things that are not physical. The connections between these things that help to form the network could also be physical like pipes or roads or wires, or they too might be non-physical.



So we can organise networks into two main types: *physical and non-physical*.

Physical networks are the actual connections between real world objects:

- a tree contains a network of branches and roots
- an integrated circuit contains a network of connected semiconductors
- a town or city contains interconnected roads between particular destinations.

Non-physical networks are made of connections between ideas and other non-physical things.

Mathematical networks connect mathematical ideas – for example, the edges of a cube are connections between the corners of the cube. If the cube is real—like dice—the connections can be physical. But the dice you might have been imagining when you read the last sentence are not real and their edges are a non-physical network.

What type of network would a social network that connects people be? The people themselves are physical things, but what are the actual connections? What connects you to your friends and family? Is it physical?

The connections in networks can be laid out in different ways. We sometimes call the layout of a network its topology. There are a few different types of network topology:

- line
- bus
- mesh
- ring
- star
- tree

Figure 1 shows examples of a computer ring and a mesh topology. What are the differences between the ring and mesh topologies? Why do you think they were named?

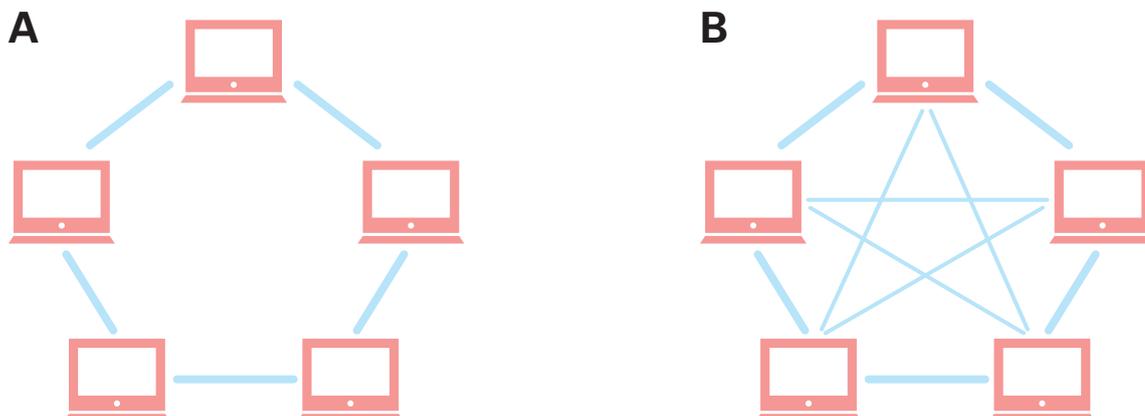


Figure 1: (A) a ring topology network and (B) a mesh topology network.

What do you think the other layouts might actually look like if they were drawn? Can you think of any other topologies?

## Networks in games

So, with the STEM video game challenge in 2022, your challenge is to build a game that involves a network in some way.

There are different ways that networks could be incorporated into a game:

### Network world

The network could form the 'world' of the game. Many games are based in a world of some kind: the background in which the world is set.

The game world could be detailed and complex, like *Fortnite* or *Breath of the Wild*. The world could be based on something in the real world, like *FIFA* or *NBA 2K*. Or the world could be something simple, like the 64 squares of a chess board.

In a *network world* game, the world is a network. Players might have to navigate around the network to complete the goal, or goals, of the game.

### Network goal

Maybe the network is part of the world of the game, or not, but either way is the goal itself of the game. The game might involve building or extending or destroying a network in some way.

There are lots of games like this, including *Train Conductor World* and *Mini Metro*. What sort of network could you build in your game?

### Connections in a network

Maybe it's the actual connections within the network that are the key part of a game. The goal of the game is related to the connections that do or don't exist, or the connections that can be built between the things in the network. *Flow Free* is an example of a game that focuses on the connections.

Of course, these are only ideas to get you started. We would love you to be really creative and think beyond what is described here.

## Some starting points to think about networks and your game

The network theme is only a starting point for your imagination to run wild.

But if you are stuck, you might consider some of these different sorts of networks and the ways that they might be incorporated into a game.

