# FCC in the Classroom

## Activities for Kids, Teachers and Parents on Telecommunications

**Federal Communications Commission**
**Consumer & Governmental Affairs Bureau**
**fcc.gov/outreach**

# Build-A-Webpage Relay Race

**Summary:** In order to learn about how the Internet (specifically packet switch technology) works, the students will "be the Internet" and race to create a webpage across the room packet piece by packet piece.

**Materials:**

- Four copies of a printed-out webpage (one page in size)
- One pair of scissors
- A table

**Set-Up:**

- Cut two copies of the webpage into several large pieces (the number of pieces depends on the size of the group.)
- Place the two remaining copies of the webpage on the table.

**Instructions:**

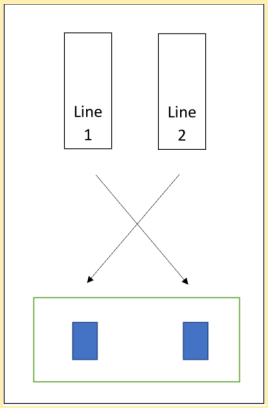
Line up the group into two lines, as if preparing for a relay race (which you are!)

Hand each person in the lines one piece of the cut-up webpage (so that each line has all the pieces they need to reassemble one page.)

Then each student goes up, one at a time, and places their piece of the webpage puzzle piece next to their team's copy on the table, trying to recreate the webpage first. They run back to their line, relay-race-style, until they finish their webpages.

**Instructions (Con't.)**

BUT WAIT: here's the tricky part! The line on the left side of the room has to recreate their webpage on the right side of the table and vice-versa, meaning the racers have to cross the room past each other!




**Post-Game:**
Ask the racers what it was like having to race across each other. Because the reason the Internet breaks up information into "packets" is so they can get past each other, so that many users can request webpages at the same time. Without packet switch technology, the Internet would be exceedingly slow.

Let the racers know that the Internet currently uploads more than 6 million websites (much like what they just did) every single second! Imagine what that would look like as a relay race!

# Cellphone Tower Ball

**Summary:** Participants will simulate being cellphone transmission towers delivering a phone call of someone driving down the road.

**Materials:**

- One ball (playground ball or beach ball work well)

**Set-Up:**

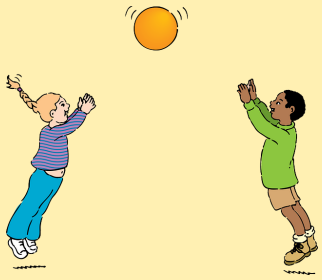
- Have participants scatter around the room (close enough that everyone could play catch, but not right next to each other)
- Give one participant the ball.

**Instructions:**

You, the instructor, will inform all the participants that they are now cellphone towers, and that the ball is a phone call you're making as you drive (but using a hands-free device: important safety tip.) The towers must keep the ball going to the tower closest to you as you drive around the room.

You then proceed to pretend to drive around the room while talking on the phone. If the ball gets dropped, pretend that your phone call got "dropped" and restart the phone call when a participant picks the ball back up.

Start by "driving" in predicable directions, and then start making unexpected turns, making the players adjust to your new direction. Make sure each participant gets a chance to catch and throw the ball.



**Post-Game:**

Ask the participants if they looked at the person they were about to throw to before throwing the ball. And ask them if, when the ball was being thrown to them, they made eye contact with the person throwing.

Cellphone towers do the very same thing!

When a caller is about to leave the coverage area of cell tower they are connected with, that tower sends a signal to the next tower letting it know that the caller is headed that direction. That next tower sends a signal back, saying that it is ready to receive the call.

This exchange of signals happens so quickly and reliably that we rarely lose our connection, even when we're watching an Internet video in the back seat of a moving car!

# Line-of-Sight Yarn Toss

**Summary:** This activity demonstrates how satellites must have "line of sight" with each other to deliver signals anywhere on the planet.

**Materials:**

- Two balls of yarn (different colors preferably): the yarn should be as long as the circumference of the room (or you can have participants form a smaller circle, if needed.)

**Set-Up:**

- Line up all participant in a big circle (or the perimeter of the room.)
- Hand a ball of yarn each to two participants standing next to each other in the circle.

**Instructions:**

Instruct the participants that this will be a race between one side of the circle and the other side. Each team will try to pass the ball of yarn from person to person until they reach the other side.

When a participant throws the ball of yarn they hold on to one end of the yarn, thus making a connection between them and the participant to whom they threw the rest of the yarn ball. Each participant then follows suit, holding on to the yarn while throwing the ball to the next, until every participant is holding part of the yarn string & it connects them to the other side of the circle.

**Instructions (con't.)**

Then, amount of yarn permitting, have them repeat the process back around the circle to the participants who originally were given the yarn.

**Post-Game:**

Ask participants if they noticed how they adjusted how they were standing from when they caught the yarn to when they threw the yarn. Satellites in space have to make similar adjustments constantly in order to transmit signals to the intended destination for the signal. Engineers and scientists had to program the satellites to do that. So long as someone has line-of-sight to a satellite, they can connect to our telecommunications networks from the most remote locations and difficult terrain!

Before all the yarn is wound back into a ball, have one person throw the blob of yarn to another person. That messy throw is what low-frequency broadcasting is like: it covers a wide area, but doesn't go very far. High-frequency broadcasting is more precise, like a laser, but it can't go past obstacles as well: it has to go around them.

# Telecom Chrono-Logic

**Summary:** This activity highlights the innovation of communication technology over time. The goal of this exercise is for students to discover the order in which each technology was invented and to encourage students to become developers of future communication technologies.

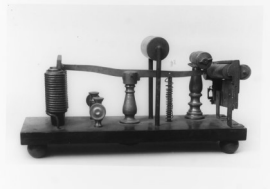
**Materials:**

- On separate pieces of paper or poster board, print examples of communications technologies, such as the following:
    - Radio,
    - Television,
    - Cellphone,
    - Computer,
    - TeleType Machine (a communication device used by people who are deaf)

**Set-Up:**

- Choose 5 students to stand, facing their remaining classmates.

- Each of the 5 students should be holding a printout representing one technology.



**Instructions:**
Instruct the remaining classmates to verbally guide the 5 students to stand in the order in which the technologies were invented (from oldest—newest).

While completing the exercise, allow the students the opportunity to discuss and debate which order is correct and why.

**To further challenge the students:**
Instruct the students to complete the exercise by a desired time.

**Post-Game:**
Once the exercise is completed, instruct the students to discuss and come up with a new communication technology that may be included in this exercise in the future. Discuss if this new technology progresses from the evolution of technology so far.

# TV Pictures in Motion

**Summary:** This activity demonstrates how television and "motion pictures" use still pictures in sequence to create the illusion of movement.

**Materials:**

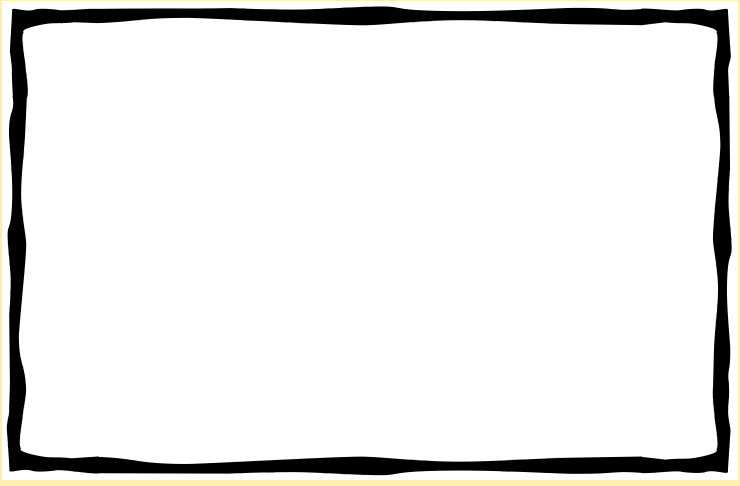
- Paper (you can draw your pictures in Frame One and Frame Two located on this page and Page 12)
- Drawing materials (pencils, markers, crayons, etc.)

**Set-Up:**

- Place the paper on a surface and prepare to draw on it.

**Instructions:**

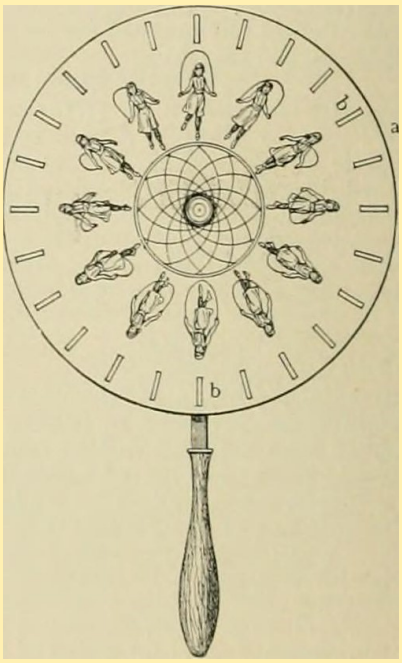
Participants should draw two pictures on two separate pages, one following the other in time. It could be a repeated motion (like a bird flapping its wings) or a movement in sequence (like a person walking down the road.) Then flip between the pages and see your pictures move!



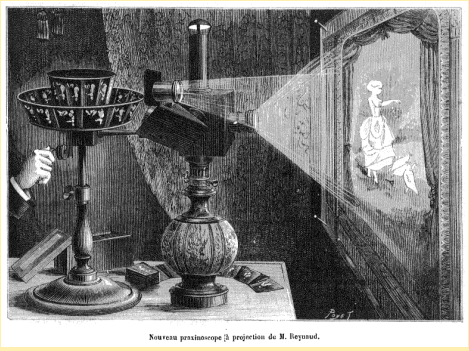
**Post-Game Discussion:**

We see movies, television and video content so frequently that we sometimes forget it's an illusion of movement that we are watching!

A series of pictures, shown to us in order, can trick our eyes into seeing movement. One of the first commonly available devices that performed this trick was the phenakistiscope which was invented in the 1830s. Pictures on a spinning disc appeared to be moving, like a modern-day gif.




This led to the creation of "cinematography", or the art of "motion picture" photography. The addition of sound that was synchronized to match the moving pictures added to the illusion of movement, but it is still basically a series of still pictures.


Nouveau praxinoscope à projection de M. Reynaud.

Additional tricks that are played on our eyes have led to innovations such as special effects, 3D technology and computer animation. What do you think the next innovations will be?

# FCC's Consumer Affairs and Outreach Division

The Consumer Affairs and Outreach Division is dedicated to educating communities about the work of the FCC and its resources that help consumers address their telecommunication needs. The division discusses how consumers can use devices safely to access technologies. It also educates consumers about what to do if their devices are lost or stolen and how to protect themselves from scams resulting from unwanted calls. For more information about the FCC, please visit www.fcc.gov/outreach or contact:


Alma Hughes (Alma.Hughes@fcc.gov)

David Savolaine (David.Savolaine@fcc.gov)

Chantal Virgile (Chantal.Virgile@fcc.gov)


**FRAME TWO**