**1.2 What Is A Phone and What Is The Tech?**

**Intro:**This session aims to engage participants in talking about and thinking about mobile technology as a set of familiar components, with the aim of demystifying the technology. You may want to select a few of these exercises, using fewer if participants are more technologically advanced. The session begins with an overview of parts of a phone to ensure that everyone is familiar with basic smart and feature phone components. Security considerations are introduced in a discussion of specific components’ vulnerabilities.

**Timing:** 1-1.5 hours

**Equipment Needed:**

* Whiteboard or large sheets of paper and markers to list out participant’s contributions to what parts of tech comprise familiar devices.
* Strongly suggested: one smartphone and one feature phone that you can deconstruct (take out the battery and SIM card) and display to participants. If these are unavailable, handouts/overhead/video that breaks out the components of handsets (for source material, see the additional resources links).
* Optional: a radio, a PC or other comparison device to point to common components and compare to handset components.

**Content Outline and Main Topics:**

1. **Exercise (20 minutes):** Parts of a mobile phone. Have participants list components of a mobile phone, then compare it to other familiar tech components.
2. **Discussion/Instruction (10-15 minutes)**: Smartphones vs. Feature Phones: What’s the difference?
3. **Bridging Concept (5 minutes):** Mobile phones are familiar.Familiarize people with the idea that phone is made up of components also found in other tech**,** just usually at a smaller scale.
4. **Instruction (15 minutes):** How the phone is like a radio.
5. **Exercise (20 minutes):** Break it down detailed notes and discussion about parts of a mobile phone.

**Objectives/Expected Outcomes:**

This exercise will help demystify phones as complex technical devices by reminding participants that:

* All complex devices can be broken down into simple components and are just “stuff.” This makes it possible top conceptualize mobile devices without being a tech expert.
* Participants already have knowledge about technology to draw from and build on.
* Phones are like radios (and a bit like computers and other technologies), which is a conceptual building block of knowledge for understanding how mobile devices and networks function.

**Additional Resources:**

<http://electronics.howstuffworks.com/cell-phone1.htm>

<http://en.wikipedia.org/wiki/Mobile_phone>

**Content**

**1. Exercise (20 minutes):** Parts of a mobile phone.Have participants list components of a mobile phone, then compare it to other familiar tech components.

**Phone:** Keep this general for now. You will be going into more detail on the various parts of a mobile handset later in this section, but try to first gather the key components for the purpose of this section (see x section of the trainer’s resource guide). Basic components to gather from participants: keyboard, screen, antennae, SIM card, baseband, microphone, speaker, microphone, battery, and ports.

If participants hesitate, ask targeted questions such as *How does the phone record your voice?* (Answer: It has a microphone) or *How does the phone store your contacts?* (Answer: It has memory, like a PC hard drive).

Which of these components are also in a PC? A landline phone? A radio? A two-way radio (‘walkie-talkie’).

**Computer:** Ask participants to identify basic computer components, and (in general) what they do. Since this is an exercise to build confidence and start thinking about how to dis-aggregate complex devices, there isn’t a need to go into high detail, just get a general sense of the “parts” of a computer. (Examples of basic components: keyboard, screen, mouse, removable media drives, ports, power supply or battery, RAM, ROM, CPU.) Which of these are found in smaller versions in a phone?

**Radio:** Ask participants to identify basic radio components. Basic components to gather from participants include: antennae, tuner, speakers, dial. Point out that traditional radio is a one-way (broadcast) communication, while phones are a two-way communication device. Which of these are found in smaller versions in the phone?

Let’s look at the phone, or “handset”!

*(These terms will be used interchangeably, and it’s good to intro this term here as you will later need to distinguish between handset, SIMs, the network, etc.).*

**2. Discussion/Instruction (10-15 minutes)**: Smartphones vs. feature phones: What’s the difference?

**Introductory questions**:

* Who has a smartphone? Other types of phones/handsets? How are they different?
* Who has had their phone break? What broke? Did you fix it or did you need to get a new phone?

**Instruction:**

* **Smartphones** are devices with more computing power. They often have higher-resolution displays and/or touchscreens, and are based on one of a few major smartphone operating systems. The most popular smartphones include iPhone, Blackberry, and devices that run on Nokia’s Symbian, Microsoft’s Windows Mobile and Google’s Android operating systems. Notice how for iPhones, Symbian phones, and Blackberries, the same company that makes the hardware makes the operating system software, and it will only run on their hardware. With Android and Windows Mobile smartphones, many different phones from different manufacturers use the same operating system.
* **Feature phones** have less computing power than smartphones, cannot run smartphone operating systems such as iOS and Android, but can run applications based on Java ME and BREW. In the current market, feature phones are basically non-smartphones that nonetheless have some features of smartphones, such as apps and cameras.
* The category of “feature phone” was created to distinguish more powerful phones from the earliest generation of widely available mobile phones with even less computing power, features, and functionalities.
* All mobile phones are remarkably complex devices. Although smartphones have more advanced capabilities than feature phones, all phones share several core components.

**3. Bridging Concept (5 minutes):** Mobile phones are familiar. Familiarize people with the idea that the phone is made up of components also found in other tech devices**,** just usually at a smaller scale.

**4. Instruction: (10 minutes)** How the phone is like a radio.

*Note: For the purposes of establishing the basic concept of how the radio is like a phone, the instructor does not need to go into depth on the finer point of frequencies, unless this is fitting for participants.*

* The existence of radio is a simple yet powerful system. Radio waves allow us to use garage door openers, radar, sonar, GPS, and to see inside the body with medical devices like MRIs. Radio waves allow us to watch TV, use baby monitors and remote controls, to listen to the news on radio stations, talk over short distances on walkie-talkies/two-way radios, and to use cell phones (p*ick the examples with which participants are likely to be familiar*).
* Begin the discussion by asking how we tune into a radio station and how radio stations are divided up (AM vs. two FM frequencies.) Listeners have a device (portable or car radio) that can be tuned to *receive* those frequencies as we *tune* the radio to receive a radio wave (in this case, a “sine” wave) *transmitted* at a very particular frequency (x amount of waves per second = the number on your dial). Listeners can tune in to receive signals that are hugely amplified by radio stations so they can reach more listeners. The antenna for a radio is part of the system that can receive a chosen frequency and then transform that into the sound you hear on your speakers.
* [Radio frequencies vary](https://secure.wikimedia.org/wikipedia/en/wiki/Radio_spectrum) from the extremely low (radio frequencies to communicate with submarines) to the extremely high (radio astronomy). Frequencies are divided up and allocated to various tools and systems accordingly. Using radio frequencies for mobile phones was made possible when engineers discovered that part of the Ultra High Frequency (300-3000 Megahertz) could be divided up in a way to support a large number of users on mobile phones via networks.

**5. Exercise (20 minutes):** Break it down: Detailed notes and discussion about the components of a mobile phone.

This activity builds on the earlier discussion of “What is it made of?” How in depth and how many components you mention will depend on your time available, the enthusiasm of your participants to share and point out various components, and if there’s any particular components you want to focus on as a trainer (e.g., if you are training for video collection and uploading, you may want to spend more time on cameras, mics, and removable media). We recommend that you at least mention the antenna, battery, SIM, removable media, and cameras, if present.

Phones are remarkably complex devices. Although some phones, particularly smartphones, have much more advanced capabilities, all phones share several core components:

* **Screen:** Screens will range in size and type. Some screens will be monochromatic while others can display a wide range of colors. Most monochromatic older phones are LCDs (liquid crystal displays), but there is now a wider variety of screen types as phones are able to display more graphics and colors. Touchscreens are currently only available on higher-end phones, but are set to expand rapidly.
* **Keypad:** Keypads can be the classic, limited, layout on early handsets, the full keyboard for smartphones and Blackberries, or the screen itself for new touchscreen phones (called a ‘soft keyboard’ because it is essentially software to display and receive input from a keyboard).
* **Antenna:** Antennas were visible on older devices, and even required being pulled in or out by the user. Most newer phones have the antennas built into the body of the phone so they are no longer “visible.” Aside from the antenna responsible for communicating with the mobile network, there may also be antennas for wifi; some manufacturers combine these functionalities into one antenna.
* **Microphone**
* **Speaker**
* **Battery:** In most phones, batteries are easy to remove. In some newer smartphones (notably iPhones), batteries are not designed for removal and can be hard to access. Removable batteries are preferable for users who use tactics to increase their security (refer to module # this will b covered in).
* **Circuit board and chips:** What this consists of and looks like will vary depending on the phone. There are chips for translating analog/digital signals, ROM, flash memory chips that store data and the phone’s operating system, microprocessors to process data (such as data sent via Bluetooth), and components that manage the power and charging of the phone.
* **Baseband microprocessor:** This is the part of the phone that manages the communications of the phone, including the communications/commands from the user to the phone and from the phone to and from the mobile network. The baseband of a phone is usually considered highly proprietary by manufacturers and can be considered a “black box” in terms of technology in some ways.
* **SIM and SIM slot/interface:** This is where your SIM card is stored in your phone. There is a limited capacity for data storage on your SIM card, and some users can decide whether or not they want to save certain data to their SIM, internal phone memory, or to removable media. Some phones are designed to manage two SIM cards. If participants may be exposed to this, mention that some phones on non-GSM networks do not have SIM cards.
* **Ports:** Port are usually for headphone jacks, mini-USB connectivity to a computer, and/or a power charger.
* **Removable media** (if present): Removable media includes micro-SD cards. Some phones also have infrared (IR) ports for “beaming” data from one phone to another, as well as Bluetooth.
* **Cameras** (if present): Most phones now have cameras that can take pictures and/or video.