A SAVOX GUIDE TO
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POC COMMUNICATIONS

MOBILE DEVICES

A Practical Approach to
Improved Mobile Team Communications

Part 1: Overview

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HOW TO CHOOSE
THE RIGHT MOBILE DEVICE

EXECUTIVE SUMMARY

As PoC (Push-to-talk over Cellular) increasingly replaces two-way radios as the preferred choice in mobile communications, more and more companies are assessing cost-efficient ways to gain PoC capabilities.

While assessments include all elements of a PoC system– mobile devices, data networks, PTT (push to talk) applications, and PoC accessories–they invariably begin by deciding which mobile devices–cellular phones, tablets, or handheld or mobile computers–will work best in a specific work environment.

The next step: considering the criteria that will narrow your selection, everything from functions and features, usage patterns and necessary training to security considerations and in some cases, even the image projected to customers.

The final criterion inevitably is cost: hard costs and soft costs; initial costs, ongoing costs, and lifetime costs.

The following pages will help you choose the right mobile device for your PoC application.
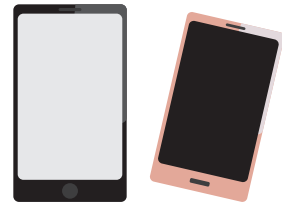
AN OVERVIEW OF MOBILE DEVICES

Basically, a mobile device is any product that allows mobile communication. In PoC systems, the mobile device allows the user to establish a data connection and communicate through a PTT application. The diversity of mobile devices today makes it hard to clearly categorize all of them, particularly when cross-over devices combine the benefits of different categories, e.g. the increasing screen size of smart phones which bring it closer to tablet solutions. *Note that for people used to work with radios, a mobile radio is a radio in a vehicle. In this part we consider all portable devices as mobile devices.*

The general categories are:

BY TYPES
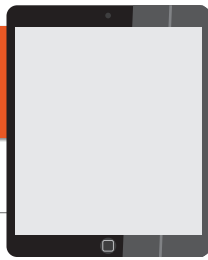
TABLETS

Tablets can be seen as the bigger brothers of smartphones with screen sizes bigger than 7 inches (18 cm). They often offer longer battery life and larger memory, but less wearability and compactness. Tablets are used in in-vehicle applications; fixed into cradles in the logistics and transportation industry, they contribute to significant cost savings by replacing expensive mobile radios (up to $1,000) with PoC tablets costing a few hundred dollars.

SMARTPHONES

Smartphones provide advanced capabilities beyond typical mobile phones, combining features of a personal computer operating system (OS) with other features useful for mobile or handheld use. Their OS software provides a standardized interface and platform for app developers. Offering touchscreen displays, sensors, cameras, and microphones, smartphones are the ideal PoC tool in areas such as law enforcement, public & private safety & security, hospitality, retail, and with team leaders and managers in industries such as construction and manufacturing.
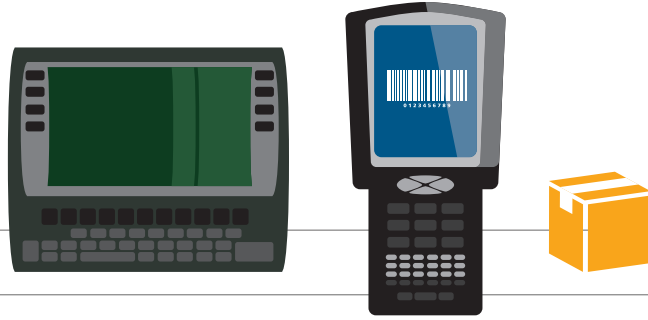
MOBILE COMPUTERS

Mobile computers–completely different from mobile phones–are usually designed for specific use case applications and offer specific hardware and features. The most recognized examples of mobile computers are bar code scanners which offer advanced scanners and full keypads as well as label printers. Mobile computers are often found in applications such as warehouse management, logistics, and retail.

FEATURE PHONES

Feature phones are basically mobile phones that are not smartphones. Feature phones use proprietary OS firmware; if they support third-party software, it is only via a relatively limited platform such as Java or BREW. Compared to smartphone software, this software is often less powerful, less integrated with other features of the phone, and less integrated into the main user interface of the phone. Nonetheless, feature phones–less expensive, requiring less training of unskilled workforce, and often close to the look and feel of a two-way radio–are still used in many blue collar applications in construction, manufacturing, utilities and maintenance.

FLIP PHONES

Flip phones, also known as clamshell phones, are a sub-category of feature phones and consist of two halves connected by a hinge. The top half usually contains the speaker and display; the bottom half, the keypad and remaining components.

The main display and keypad are protected when closed. PoC communication is possible on a closed flip-phone with a dedicated PTT button or an accessory. Flip-phones are popular in certain countries like Japan, but are also a common choice for business applications in the USA.

PTT PHONES

PTT phones can be any of the above mobile devices equipped with a dedicated PTT button on the side of the device to facilitate PoC communication. These PTT buttons, similar to the PTT buttons on two-way radios, allow the user to trigger a PoC call without unlocking the phone screen to press the virtual button on the screen. PTT applications take control of this button when being installed and the user can usually specify a preferred talk group or channel for 1-to-many communication when the button is pressed. PTT phones, especially ruggedized versions, are used in rough environments even in the military and defense sector.

BY RUGGEDNESS

CONSUMER GRADE

Consumer grade devices have not been designed to meet specific robustness standards such as IP or MIL-STD 810-G. Examples would be tablets and smart phones such as Apple iPhones, Samsung S series and Note series.

SAMSUNG

DURABLE

Durable phones are not IP/MIL-STD rated but have features to increase robustness. An example of a durable device would be the Samsung S5 Active which is a more robust version of the Samsung S5.

INTRINSICALLY SAFE (IS)

IS devices can be used in explosive environments without the risk of igniting inflammable substances. These environments are subcategorized in classes and divisions for the US approvals for IS; ATEX/Ex regulations are used in the European Union specified zones. The approval for a phone will define in which zones the phone can be used. When using an accessory, the approval for intrinsic safety must be done together with the phone to be valid. The approval of the phone alone does not make it intrinsically safe with an approved accessory. IS approved phones can be found in industries like mining, petrochemical, and the processing industry.costing a few hundred dollars.
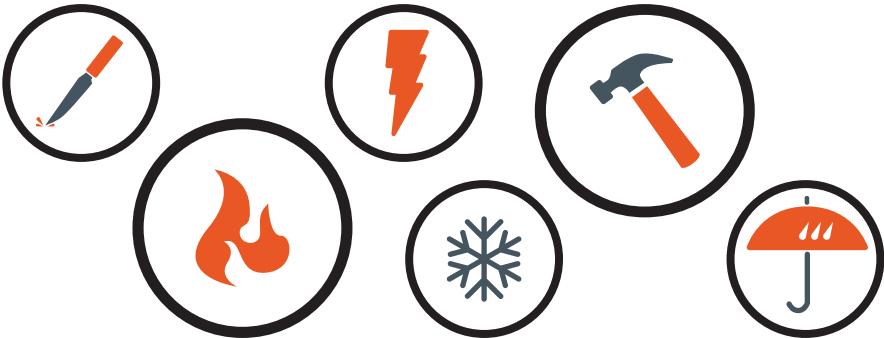
SEMI-RUGGED

Semi-rugged devices are all devices designed to meet at least the IP54 standard.

IP54

FULLY-RUGGED

Fully-rugged devices meet a higher standard than IP54 and a certain number of MIL-STD 810-G where the compliance to one test in the MIL-STD 810-G catalog often qualifies the device as MIL-STD approved.

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BY MANUFACTURER

RUGGED AND PTT PHONES

Rugged and PTT phones, traditionally sourced from the original manufacturers—e.g. Kyocera, Ruggear and Sonim—are becoming available from a new group of competitors. Mobile phone and smartphone vendors are beginning to introduce semi-rugged and fully-rugged devices that conform to IP specifications and may compete for market share for applications such as field service (VDC Research Group). Intrinsically safe mobile devices, however, remain the province of the original experts, either directly or through their partners.

CONSUMER GRADE PHONES

Consumer grade phones are the cell phones you see in everyday life.
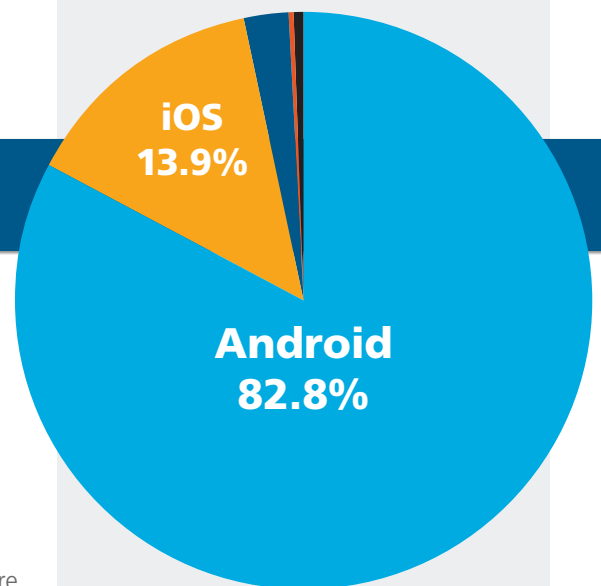
MOBILE COMPUTER

Mobile computer manufacturers offer specific solutions for different applications such as healthcare, logistics, warehouse management, and retail. Main manufacturers in this field are Datalogic, Handheld, Honeywell, and Zebra (formerly part of Motorola).

According to International Data Corporation (IDC), worldwide marketshare in mid-2015:

others 45.7%

Samsung 21.4%

Apple 13.9%

Huawei 8.7%

Xiaomi 5.6%

Lenovo 4.7% (incl Motorola)
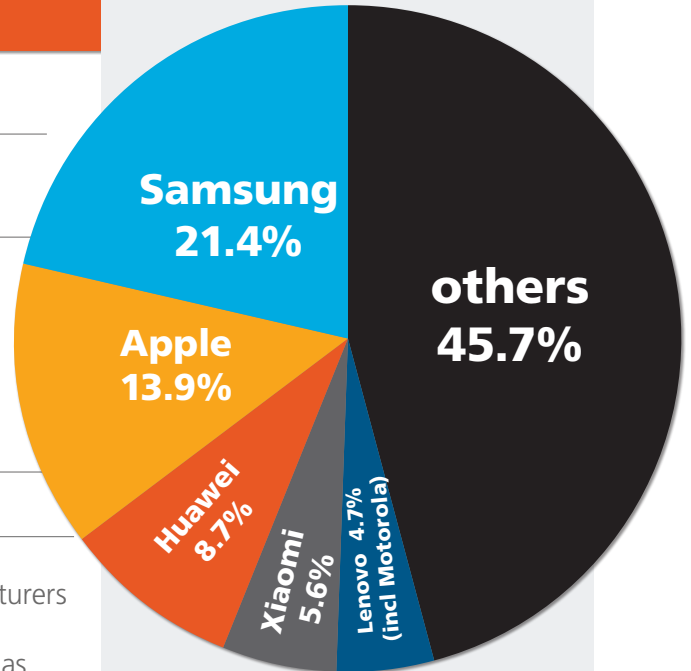
The different OS in smartphones:

These market shares vary hugely in different regions of the world with Apple's iOS having a market share of about 33% in Australia and the US while only about 4% in Brazil.

iOS 13.9%

Android 82.8%

BY OPERATING SYSTEM

Operating systems differ among manufacturers and types of mobile device.

For PoC users, the OS plays an important role when it comes to compatibility of PoC applications. Most applications support Android and iOS. There are fewer applications supporting Windows or Blackberry phones. Even within the two main OS, Android and iOS, there are differences in usability with PoC applications. For example, Apple's iOS, with stricter rules and less flexibility than Android's OS, may not provide the same user experience, especially when using accessories. Also, feature phones using proprietary OS such as Brew often only support carrier-grade PoC applications. This is also the case for mobile computers which are becoming increasingly available with standard Android OS.

Android 82.8%, iOS 13.9%, Windows 2.6%, Blackberry 0.3%, others, 0.4%.

CHOOSING THE RIGHT MOBILE DEVICE FOR YOUR APPLICATION
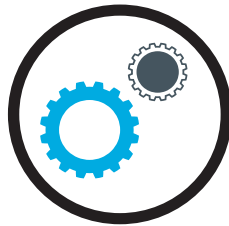
Functions & Compatibility

What will you ask your mobile device to do? If it's simply communications, a small phone might be your best option. But if you intend to work with business apps—your PoC app, plus task trackers, information exchange, app access control, whatever—a smartphone or tablet might be your preferred choice. Here, compatibility with the operating system and its version is essential in order for the apps to function properly. It's a critical factor in choosing your mobile device.

Bluetooth

Features

Data speed will influence the quality of your PoC communications. Most 3G phones will provide an adequate connection, but 4G/LTE phones are the preferred option. Other

features? GPS location tracking is a mandate for efficient workforce tracking (this will impact battery life). If you'll use the camera regularly, confirm that it offers the required

resolution and storage. Connectivity through WiFi or Bluetooth, and Near-field-communication (NFC) are also commonly used in business environments.

Technology Skills of Employees

Training costs are part of the hidden costs of any solution. For low- skilled workforces, simple phones such as feature phones might be sufficient for PoC communications. Feature phones also help restrict workers access to other apps like Facebook. (Access can also be controlled through workforce management apps.)

High-skilled workforces with more complex tasks requiring them to process more information and interact with more apps would be best served by smartphone-type mobile phones. Having different mobile devices attuned to the job and technological skills would increase the value and efficiency of a higher skilled workforce.
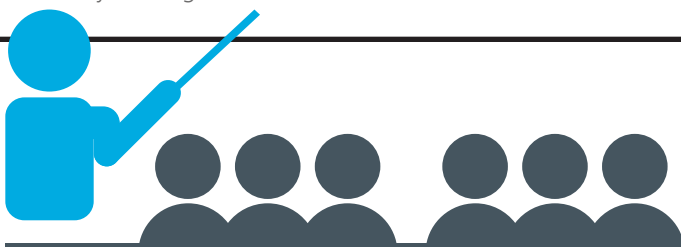
Environment

How rugged does your mobile device have to be? Will it be used indoors, outdoors or both? Will it be in contact with water, liquids, chemicals, sand dust, concrete dust or other substances that could lead to high turnover costs? According to VDC Research Group, the primary sources of failure of non-rugged handheld/PDA mobile computers centers on environmental issues. Exposure to extreme temperature fluctuations, water, moisture, humidity, excessive vibration and in certain cases, electromagnetic interference exposure are major contributors. For regular use in an outdoor environment, IP54 rating should be the minimum. If you work in an explosive environment, intrinsically safe mobile phones and accessories are a must.
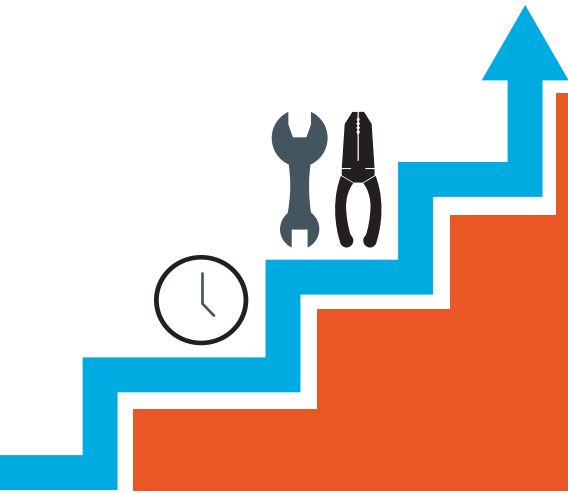
Availability & Upgradability

Lifecycle management is an important factor in any mass application; even the most robust products need a maintenance plan and a support strategy. Will your mobile device still be available in 12 months? Will it be possible to upgrade to the latest OS and software versions? Or will you have to choose new devices with new user interfaces and connectors requiring new training for your workforces? Support features such as comprehensive repair coverage (covers accidental breakage) or advance exchange (overnight replacement devices) can help ensure that your business maintains its productivity level as devices are repaired or exchanged.

Reputation

One criterion often neglected is reputation; that is, the image you want to project. This is of particular value in companies working in hospitality, from hospitals to hotels, restaurants, even retail. Will workers be seen using PoC technology in front of customers? Imagine the impression on guests of a 5-star Hilton Hotel when employees are using worn out mobile devices as opposed to the latest iPhones.

Security

PoC communication is fast becoming the preferred option in covert operations; the smallest covert radio can hardly keep up with the functionality of a smart phone. Security in such cases is of paramount importance and a main criterion when choosing the phone as well as PoC applications and accessories.
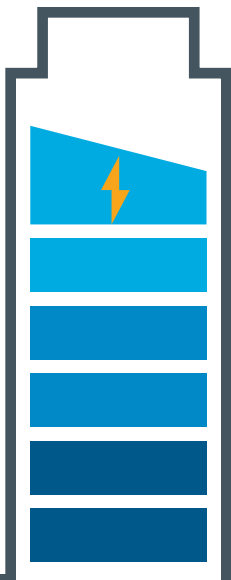
Battery

Battery life is crucial to any work application. Battery size or capacity is merely an indicator of how long a battery might last; it is highly recommended to verify in pilot projects if a battery fulfills the requirements of your intended usage. PoC communication itself does not consume excessive battery power, but your other applications might. For example, GPS location tracking, especially with short refreshing rates, drains batteries very quickly. Other questions to ask: how long does the battery have to last? How many shifts? How long is a shift? How much time is available to recharge it? If little time for recharging is available, replaceable batteries might be a good choice, although this often has a negative impact on robustness and IP ratings.

Additionally, charging solutions might be a concern. Having a sizable workforce recharging phones with small micro-USB adapters could prove difficult. More recently, mobile devices are offering wireless charging where the mobile device is simply placed on a platform to charge.
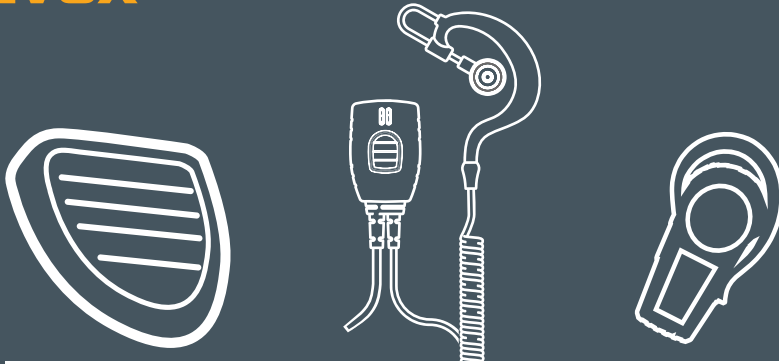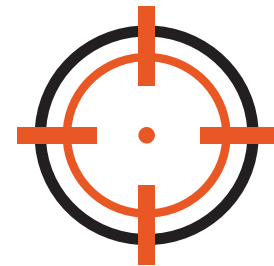
POC ACCESSORIES ARE USED IN ENVIRONMENTS WHERE THEY:

1. FACILITATE COMMUNICATION AND SAVE TIME AND MONEY
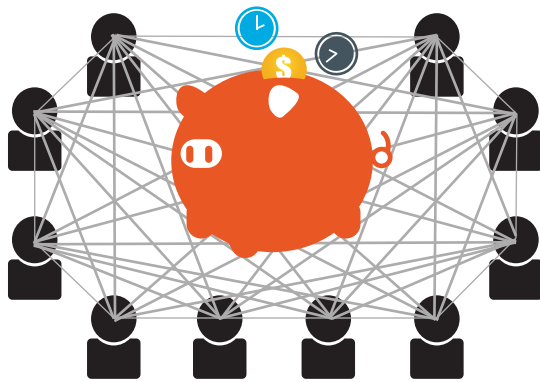
2. REDUCE DISTRACTION THROUGH THE PHONE AND ALLOW THE WORKER TO CONCENTRATE ON THE TASK AT HAND

Accessories

The compatibility of an audio accessory should be checked before the purchase of a mobile phone to prevent limiting your selection. Two things to consider:

- **Connectivity** requirements of the phone. For wired accessories, the headphone jack is your interface. The standard in the mobile phone industry is a 3.5mm 4-pole connector in the order LRGM (left speaker-right speaker-ground-mic) from TRRS (tip-ring-ring-sleeve). Most accessories support this interface. Some tablets and mobile phones are not made to support a microphone accessory. These 3.5mm connectors are only 3-pole connectors and do not support PoC accessories. Some PTT phones offer specific connectors which can have specific electrical characteristics or 5-pole connectors which are unique to these phones.

  However, Bluetooth technology, less cumbersome and more convenient than a wired connection, is quickly becoming the new standard. For Bluetooth accessories, the Bluetooth version and profiles are important. Most Bluetooth accessories require at least Bluetooth 3.0. The Serial Port Profile (SPP) is the most used profile for PTT communication. For Bluetooth 4.0, the GATT profile will allow the PTT communication.

- **PTT application compatibility.** For an accessory to work properly with a specific mobile phone, the accessory support must integrate with the PoC app. For most consumer grade devices which use standard OS, this is not a difficulty. For featured phones, it requires significant cooperation among the phone manufacturer, app maker and accessory manufacturer, cooperation that not all accessory manufacturers provide.

Further accessories that might be required could be cases, holsters, cradles, and docking stations. How shall the workers carry the mobile device? Will the mobile device be mounted somewhere? Especially for tablets, this question needs to be asked.

In addition, non-rugged mobile computers are frequently equipped with numerous plug-in accessories (e.g. credit card readers or barcode scanners) to provide the same level of integrated functionality provided by a similar rugged mobile computer in which the accessory is integrated into the computer itself. These plug-in scanners/imagers and wireless cards represent a significant source of failure when the device is dropped. (VDC Research Group)

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Costs

For most companies, cost is crucial and often the most important component. There are of course initial costs, but these should not be the only consideration. The total cost of ownership (TCO) approach covers the complete costs that are incurred during the lifecycle of a product. Below, the TCO approach from the VDC Research Group:

HARD COSTS

Hardware Costs	Software Costs	Development Costs
Platforms	Upfront Fees	Application Design/ Development (Standard & Customized)
Peripherals	License Fees (incl. GUI/Preso; NW; App.; etc.)	Integration (Internal & Third Party)
	Development Customize	Staging

SOFT COSTS

Traning Costs	Operational Costs	Downtime Costs
Initial User Training	System Maintenance (Standard; extended; replacement.; etc.)	Hardware Replacement
On-Going User Training	Third Party/ Internal Technical Support	Lost Manpower/ Wages
	Hardware/ Software Upgrades	Lost Revenues
	Application Management (Third Party/ Internal)	

A caution regarding costs: if a mobile device meets your cost considerations but falls behind in other criteria, there is a good reason to re-think the mobile device strategy. Sometimes one criterion, for example the accessory compatibility, can be of greater importance if end users mostly interface with it rather than the mobile device. In such a case, a different mobile device could be chosen to accommodate the right accessory.

CONCLUSION

Your mobile device is the keystone to your PoC system. Ideally, it will be the mobile device that works best in your work environment. It should:

✔ **Function flawlessly in a pilot project with the selected PoC app, accessories and the business apps you intend to use**

✔ **Deliver the effectiveness and efficiencies that help you optimize your PoC communications**

✔ **Be upgradable in both software and the OS to ensure a long and productive lifecycle**

As cellular networks improve their coverage and LTE networks emerge, your mobile device is the access point to the next generation in mobile communication.

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