TECHNICALLY SPEAKING

POP *on* JOB

A father adopts his daughter's perspective to describe what he does at work all day and why he loves it.

by Mr. Alan Clayton (LTC, USA, Ret.) and Ms. Ashley Buzzell

A lot of very smart people work in Army acquisition—scientists, technicians, engineers—and many are the best in the world at what they do. That work is often mind-bogglingly complex, given the nature of the systems that they help to design, develop and deliver for the benefit of the Soldier. They often speak in technical language that people outside their area of expertise just wouldn't understand. But it's important that taxpayers and members of Congress and their staffs understand it—not just because taxpayers have a need and a right to know, but also because it's really hard to have a conversation when only one party speaks the language.

And then there are children. So, what's a father—who spends his days working in the alphabet soup of DOD—to do when his very inquisitive daughter asks, "What do you do at work, Daddy?" Perhaps even more important than explaining to adults what science and technology are all about is explaining it to children. One father, Alan Clayton, wrote this poem to illustrate the strategy he would use to try to explain to his 5-year-old daughter what he does at work.

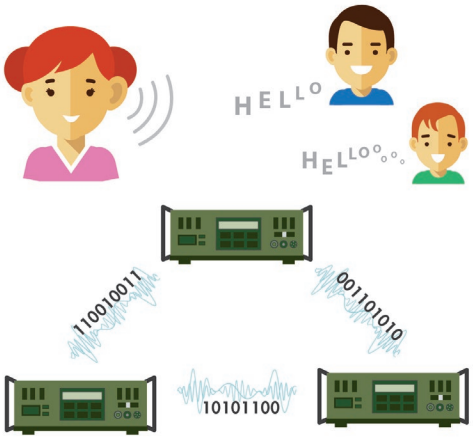
Pop works on something like a phone. In fact, he works a lot.
But with something he calls "soft-where," mostly like a phone it's not.
It was hard for Pop the other day, when I asked him "why?"
To explain it all again, but I asked him to please try!

S-D-R and S-C-A and A-P-I mean nothing to my ear.
Instead he tells of songs or talk, sent from far to near.
Each of the many songs the not-a-phone can make,
Could be songs on other not-a-phones, if his computer-speak they take.

S-C-A, he says, is his computer-speak playground.
Little bits of brain are safe to stay, play and run around.
A-P-I is sort of a "between the mouth to ear thing,"
The class of call, the red, the black and other stuff to bring.

I want to understand why this takes Pop away from home,
To a place that he calls work, where I don't think he's alone.
Computer-speak is the thing, and it concerns my Pop.
To make the "soft-where" run, takes a lot of time in the shop.

His wish and mine, they are the same. It is simply to always hear
And understand just what was spoke when the sound touches the ear.



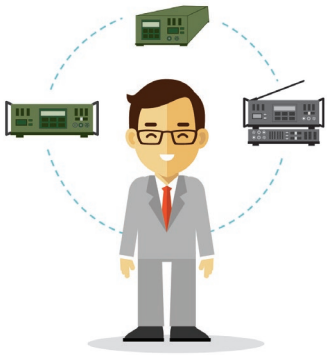
He tells again with easy words, of how they make a ring.
These computer-speak things work together, and sense sometimes do bring.
Each computer that is not-a-phone speaks to many others.
To make sure they understand the call, like when I hear my brothers.
They use the same words almost all the time, but in a different way.
When the expression is always done the same, I hear what it is they say.

So the not-a-phone is a computer, but really hard it's not.
The A-P-I does tell someone how to speak a lot.
I see this approach can make it small, stop too many a situation
Where people make totally different things and stop the conversation.

I see where A-P-I is "how," and S-C-A is "what,"
What way to speak, and what to say, it stays in or it gets cut.
Can S-C-A please tell me, like "and," "but" and "or,"
How to control the "soft-where" from the top down to the floor?

Remember A-P-I is "how to speak," the S-C-A has reason why.
I think doing things together is easy if you try.
No problem need be had, if enough of this you follow.
Pop says S-C-A with A-P-I is the road to our tomorrow.

What they are and how they work, you may not care too much.
Important is that work it does, on not-a-phones and such.
When not-a-phones talk together and all say the same things,
Then my Pop is happy, and from work a smile he brings.



He gives away the computer-speak, the "soft-where" is all free.
Because he always wants others to understand, you see?
Even when the box they change, or give it a different name,
If that "soft-where" they will use, the speak will be the same.

I will look at him and understand a part of what he'll say.
I know that what he does, is to make tomorrow a better day.

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SIMPLY PUT

Software-defined radios (SDRs) are systems that can change their radio emission and reception functions through programming that can be modified and updated. They can change the type of modulation and encoding, or the frequency band and the intended effect, from data transmission to jamming, or change from reception to sensing. The new tactical radios being procured by the U.S. military are SDRs. Technology advances faster today than it did during the procurement of the current voice (Single-Channel Ground and Airborne Radio System (SINCGARS)) or data (Enhanced Position Location Reporting System (EPLRS)) radios that were the mainstays of the Army for many years.

To explain simply the difference between the newer, software-defined radios and the older, hardware-defined radios, consider a smartphone. If you had a truly software-defined cellphone, it would have required only a software update to progress from 2G to 3G, 4G or LTE. However, current cellphones are hardware-defined and use hard-coded modulation techniques, such as LTE, Wi-Fi or Bluetooth. The original iPhone, for example, worked only with 2G and is not upgradable.

There are good reasons for manufacturers of smartphones to do this. One is profit. If your phone could be upgraded to the latest and greatest with nothing but a software update, there would be little reason to go out every year or two and buy a replacement. But as compelling as profit may be, so is the speedy advance of technology: Cramming all that tech into such a small space requires sacrifices. The chip that runs the phone—its computer brain—has to be very small. Technological advances make it possible to produce smaller and faster chips that significantly increase speed with each new model.

However, what is true of consumer electronics isn't necessarily true of military electronics. For tactical users, there are several reasons for wanting to be able to change the signaling software or waveform. These include corrections for security, improvements in efficiency and changes to adapt to new technology, among others. Military radios are expected to have a life span of 10 to 15 years for a vehicular model and five to 10 years for a portable one. And they don't have to fit in a shirt pocket. Plus, improvements must be made in parallel with all other military radios at the same time to maintain interoperability. Not so with smartphones, despite their expense. Big changes to the technology require replacement of the entire phone.

TACTICAL SMARTPHONES
Soldiers used SDRs during Network Integration Evaluation 15.2, one in a series of Soldier-led evaluations designed to further integrate and rapidly advance the Army's tactical communications network. (Photo courtesy of the Program Executive for Office Command, Control and Communications – Tactical)

The software communications architecture (SCA) is a specification that defines a software architectural framework for management, control and configuration of an SDR. Although it is often misunderstood to be an operating system (OS), like Windows, the SCA specifications are actually only an explanation of what the manufacturer's own OS needs to include and be able to do. The specifications tell the manufacturer how the software they develop using the application program interfaces (APIs) must interact with the waveforms' software. Both—the SCA and API specifications and the actual waveform software—are mature technologies available for the manufacturers to implement.

SDRs themselves can be thought of as a collection of components that are commanded or employed by the software. Examples include GPS, Ethernet, encryption and even the processors. Radio services are persistent libraries of software code that provide common software functions to the waveforms. APIs are standardized so that every manufacturer's radio has the same exact protocols;thus, the different software packages can talk to each other in the same way.

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