



NDIA ATC Meeting Commercial Liaison Report

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National Instruments

November 1, 2015

AGENDA

- Mergers/Acquisitions/Spin Offs
- Advancing Instrumentation in the 5G Era
- PXI, VXI, AXIe, LXI Refresh
- Better Buying 3.0

Mergers/Acquisitions/New Starts

- Keysight Technologies acquired Anite – a leading supplier of software solutions for wireless research and development.
- Teradyne acquired Universal Robots, the leading supplier of Collaborative Robots.
- Danaher merged their communications businesses (including Tektronix Communications and parts of Fluke Networks) with NetScout a global provider of network management solutions.
- National Instruments announced its acquisition of Micropross, leading supplier of test systems for Near Field Communications , smart cards, and wireless charging test systems.
- Danaher announced the acquisition of Pall Corp, a bio-tech company

From 1G to 5G

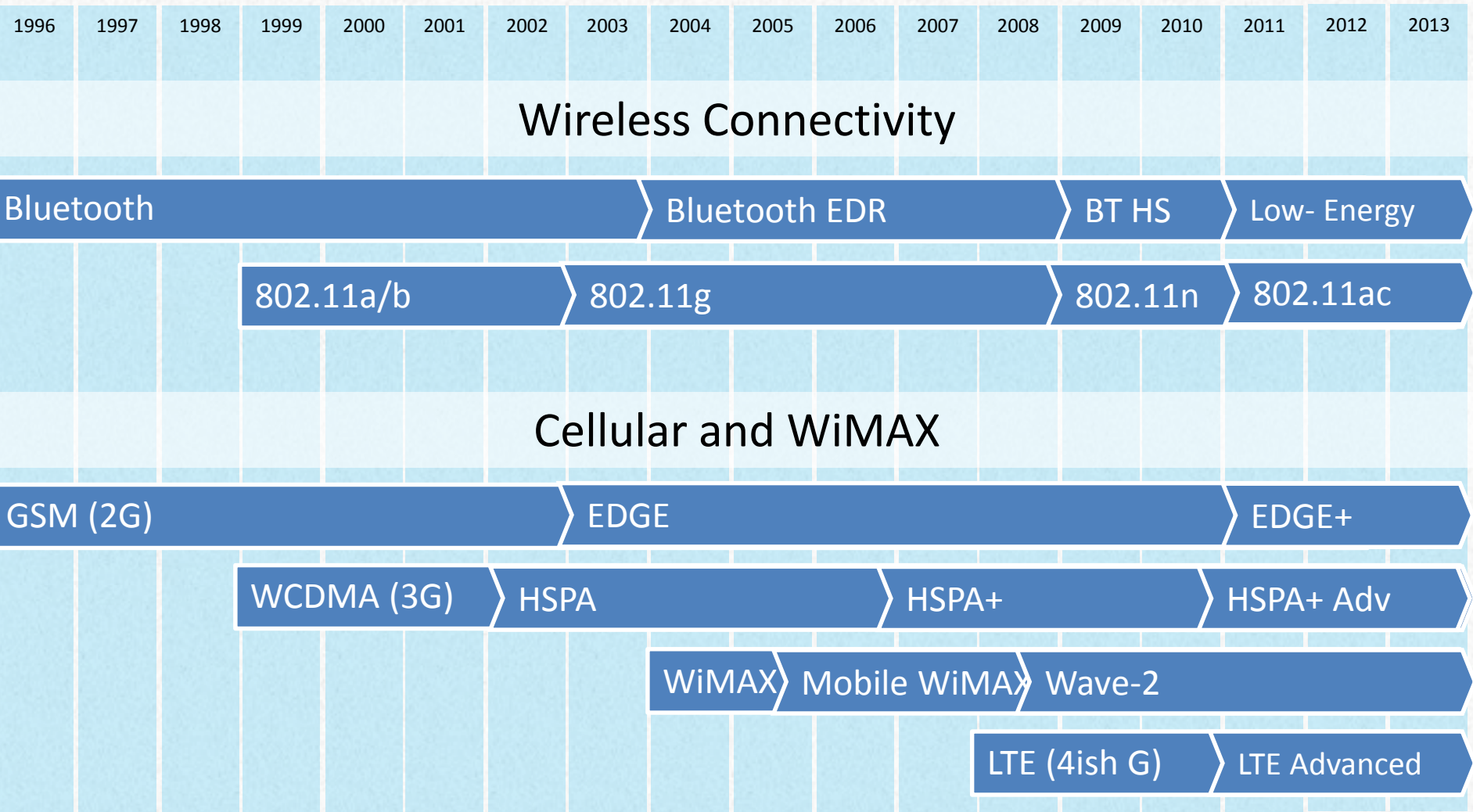
How Moore's Law is Advancing
Instrumentation in the 5G Era

Est. time to download a 100-minute HD Movie Sized at 1.4 GB

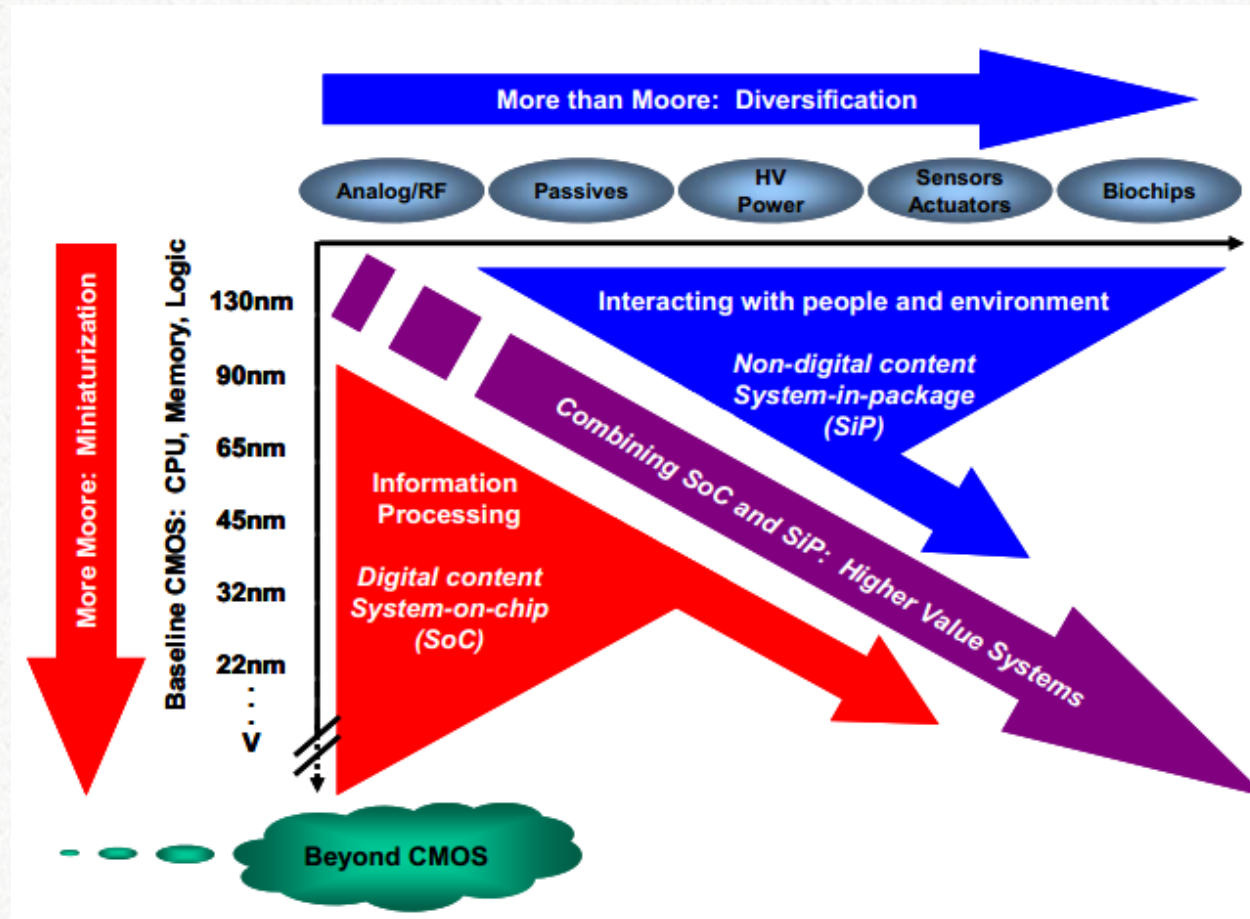


Year	1984	1991	2001	2009	2015
Technology	1G	2G	3G/3G+	3.9G/LTE	4G/LTE-Adv
Bitrate	N/A	300 kbps	42 kbps	129 Mbps	300 Mbps
Ch. BW	30 kHz	200 kHz	5 MHz	20 MHz	100 MHz

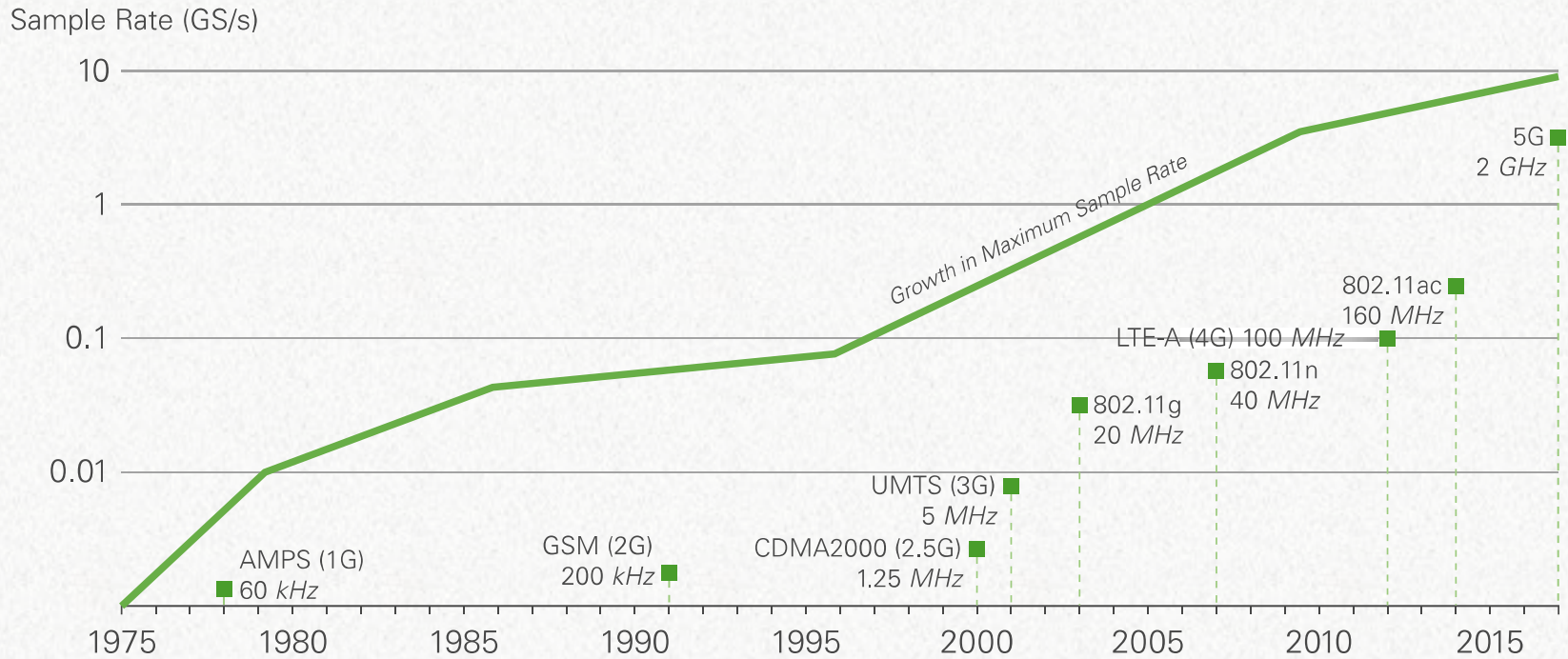
Evolution of Wireless Standards



More than Moore

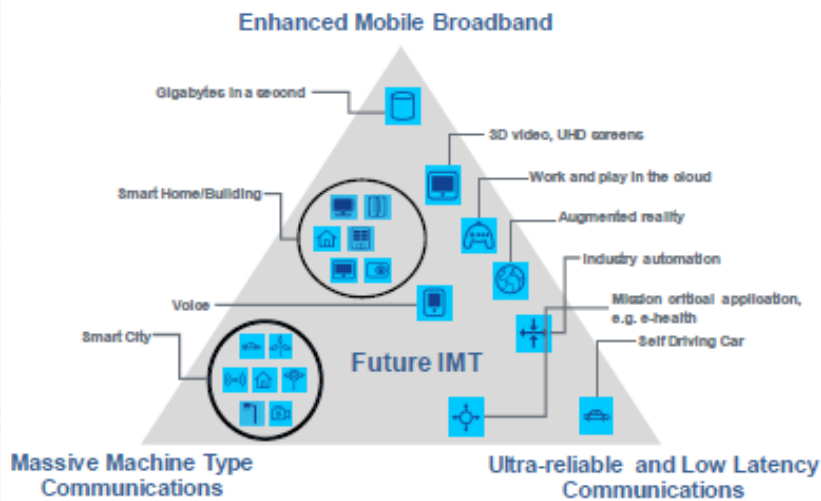


From 1G to 5G

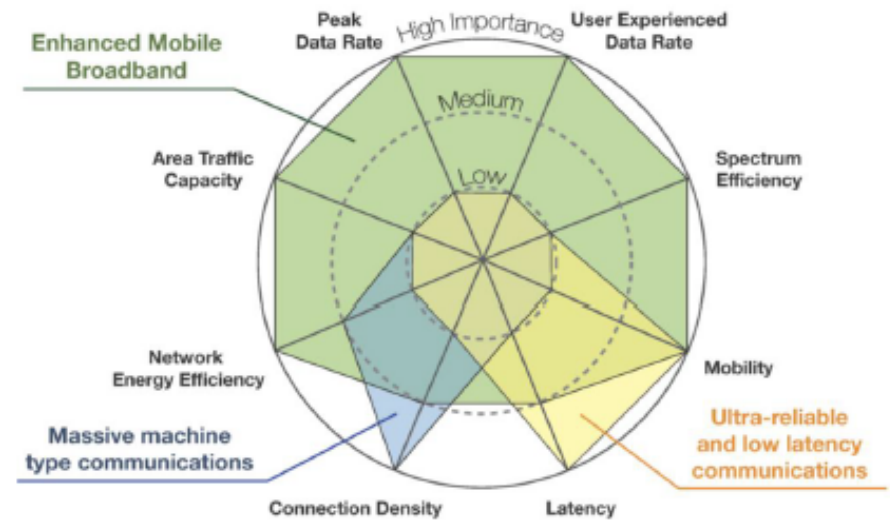


5G Defined | 3 Use Cases, 8 Key Capabilities

ITU-R vision for IMT-2020 and beyond



Three use case categories



Eight Key Capabilities

“Framework and overall objectives of the future development of IMT for 2020 and beyond”

FCC Embraces mmWave

FCC issued a Notice of Proposed Rule Making (NPRM) that proposes new flexible service rules among the 28 GHz, 37 GHz, 39 GHz, and 64-71 GHz bands.

Bands Above 24 GHz for Possible Mobile Use

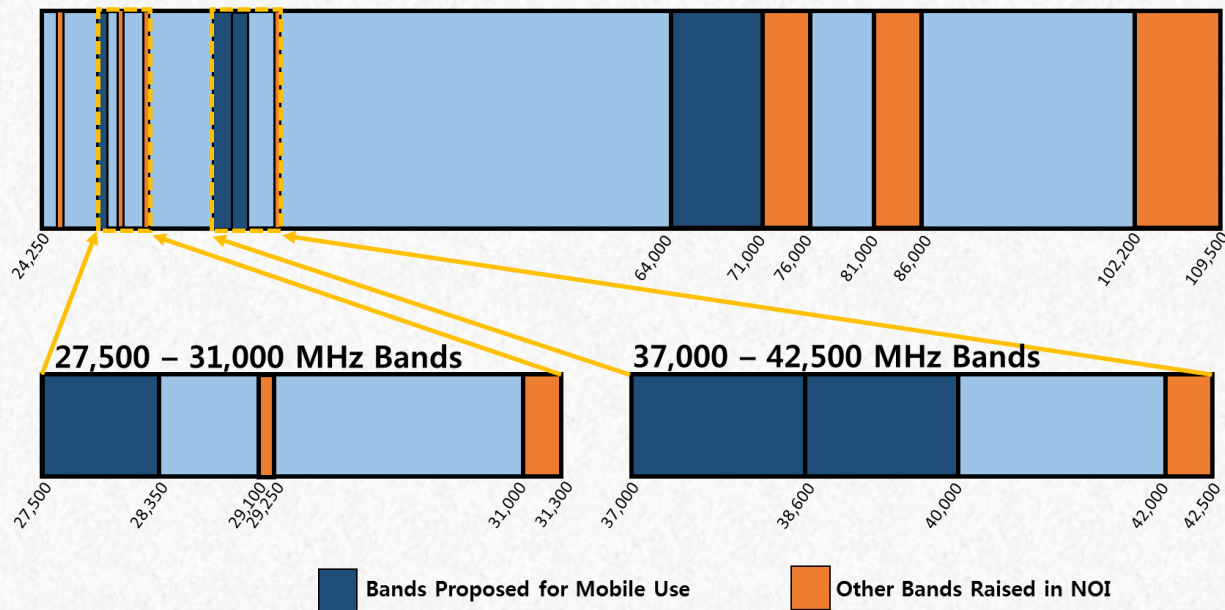


Image Source: FCC 15-138, Page 12, Oct 23, 2015

<https://www.fcc.gov/document/fcc-promotes-higher-frequency-spectrum-future-wireless-technology-0>

Oct 23, 2015

6x the Commercial Spectrum for 5G

“... Let me just put in perspective what's going on here. We are talking about **3850 megahertz of spectrum** that we are proposing today. **That's six times all of the commercial spectrum that this agency has ever authorized.**”

Tom Wheeler, FCC Chairman



“With the [5G] race on, today’s rulemaking gets us out of the gate.”

Jessica Rosenworcel, FCC Commissioner



VXI & PXI Refresh



- VXI Bus Consortium:
 - 13 Members
 - > 1500 Products
 - 394 Mfg. ID's issued
 - VXI 4.0
 - <http://www.vxibus.org>
 - Products at <http://vxibus.org/products.html>
 - Annual Meeting
 - Via teleconference prior to Autotestcon
- PXI Systems Alliance (PXISA):
 - 68 Members (10/2/2015)
 - PXI-7: PXI Multicomputing HW Spec, Rev 1.0
 - PXI -8: PXI Multicomputing SW Spec ,Rev 1.0
 - PXI-9: PXI & PXI Express Trigger Management Spec ,Rev 1.0
 - www.pxisa.org
 - New products
 - Annual Meeting
 - ATC –NI Conf. Room
 - Date: Nov. 4 (Wed.)
 - Time: 5:30-6:30 PM

AXIe & LXI Refresh



- AXIe Consortium:
 - 11 Members (10/2/2015)
 - 29 Products (10/2/2015)
 - AXIe 1.0 Base Arch Spec, Rev 2.0
 - AXIe 2.0 Base Software Spec, Rev 1.0
 - AXIe 3.1: Semiconductor Test Extension, Rev 1.0
 - AXIe-0: Low Cost Instrumentation and Switch Architecture
 - AXIe Wide PCI Express available soon
 - www.axiestandard.org for overview presentation
- LXI Consortium
 - 53 Members (10/2/2015)
 - 2728 products(10/2/2015)
 - LXI 1.4 (Core + 7 Extended Functions)
 - New LXI Reference Design
 - Soon to be released
 - Available to members only
 - <http://lxistandard.org>
 - LXI Meeting/Plug Fest
 - Dates: Oct. 21 - 23
 - Place: Chicago, IL

Better Buying Power 3.0

"To make the most of the research dollars, DoD plans to rely heavily on the **concept of rapid prototyping.**"

Objectives with strong alignment to Test & Measurement Industry

Achieve Affordable Programs

Incentivize Productivity in Industry and Government

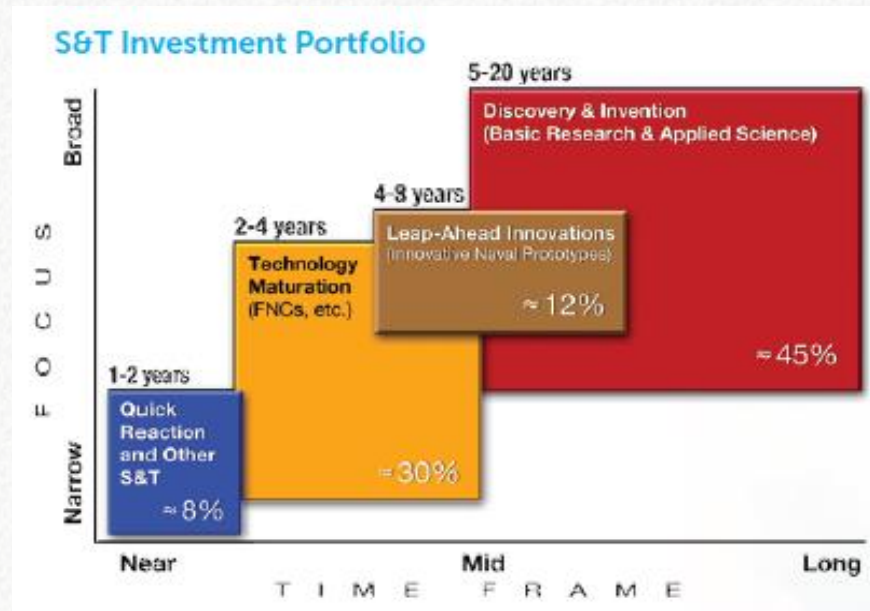
- Remove barriers to commercial technology utilization
- Increase the productivity of corporate IRAD

Incentivize Innovation in Industry and Government

- Increase the use of prototyping and experimentation
- Emphasize technology insertion in program planning
- Use Modular Open Systems Architecture to stimulate innovation

S&T Investment Priorities

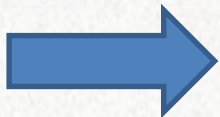
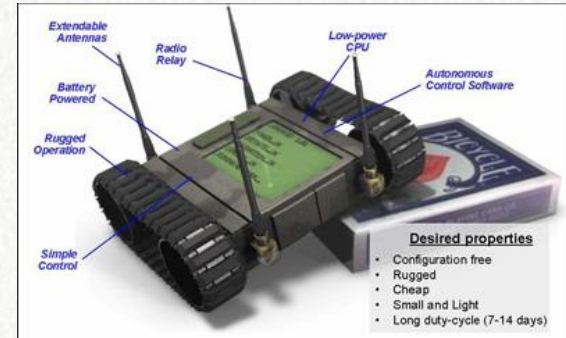
What ONR Does Now Affects Test in the Future



- Quick Reaction S&T - war fighter centric technology projects responsive to the immediate needs of the fleet.
- Technology Maturation - delivers critical technologies to programs.
- Leap-Ahead Innovations - higher risk / higher payoff.
- Discovery & Invention - fundamental science with a long time span needed to mature discoveries.

Technology Venue for Future Meetings

- Autonomous Systems/Proposed Standards.
- Multichannel RF/Microwave
- Synthetic/Software Defined Instrumentation
- ADC & DAC Technology
- Compact Signal Switching
- Advances in Modular Architectures
- Embedded Design & Test
- Reconfigurable/FPGA based Instrumentation
- Heterogeneous Computing
- Automation/Abstraction Tools
- **Other technologies** as nominated by NDIA ATC members:
 - Technology focused
 - **NDIA ATC Supplier Inputs encouraged/needed.**



Questions/Discussion?