POWERING NETWORK-CENTRIC OPERATIONS

Good morning.

Thus far at DARPATech, you've heard from DARPA's systems offices, about challenges they are addressing, and the problems they seek to solve.
A recurring theme in these presentations is the demand for networks that can unlock the true potential of future weapons systems.

Powering Network Centric Operations.
That's the common thread of most ATO programs, reflecting the fact that the Network is becoming our most important weapon.

The warfigher of tomorrow will operate in a world characterized by immersive communications: A world in which communications devices will be truly ubiquitous, embedded throughout a warfighter's environment much as computers are embedded today.

Immersive communication holds the potential to transform the nature of warfare.

In the past, serious technical challenges have prevented this degree of connectivity.
For example, the people who plan the war and the people who wage the war have lacked the benefit of direct, sustained communication.

If we succeed, this new communications environment will bridge the gap between the war-fighters and the war-planners - enabling shared awareness, collaboration and improved synchronization to extend from the senior levels of command down to the individual soldier.

However, achieving battlefield success through net-centric operations takes more than just connecting together a bunch of computers.

Our ability to manufacture networks has led to some of the most significant advances of the past generation.

Networks provide the perspective that makes patterns visible...

They enable the formation of new and more powerful entities by unifying disconnected objects

Networks aren't novel - but our ability to harness them for DoD is about to make a great leap forward...

{pause}

{pause}

Networks - and our ability to harness the power of network centric warfare - is central to that aim: And that is the common theme - the common thread that runs through ATO's efforts...

...Reflecting the fact that the Network is the key to modern warfare.

We all know of course that bytes don't kill enemy combatants - bullets do.
But today, bytes steer our bullets, and tomorrow -- even more so.

Whether we're talking about Future Combat Systems - or any of the other programs we've heard about: It's safe to say that none of these future weapons systems will work without advanced networking.
And it is vitally important for each of you to understand-- --Just hooking up individual nodes into a network is not sufficient.
The strategic, operational and tactical systems of tomorrow will only reach their full potential when commanders at all echelons have access to the tools and technologies that will provide the ability to focus our forces with decisive results whenever and wherever the commander requires.

Translating those broad objectives into programs is the future challenge faced by ATO.

If you look at our earlier networking programs, they fell into four technical categories:

> Increasing data rate
> Improving spectrum usage
> Network management
> and Information assurance

In the future this will not be good enough.
We will be asking specifically how new program ideas can directly benefit the following tenets of Network-Centric Operations:

First ... Shared Awareness:
Does it help our combat units and unmanned autonomous systems leverage information from other nodes - can it keep us all on the same page, with our weapons pointed in the right direction?

Second ... Collaboration:
Does the new program idea enhance Collaboration?
More specifically we ask: Does it help our distributed units fight together cooperatively?

Third ... Synchronization:
Does the new program encourage Synchronization - By this I mean ... can we sequence and time our operations to our advantage.
Can we deliver power from distributed forces simultaneously so as to magnify our combat power?

Finally ... Understanding:
We're looking for programs that advance the commander's understanding of the battlespace - and enables commanders at all levels of command to make the right decisions at the right time.

Taken together, we're looking for programs that provide a collective capacity to lift the fog of war... And strike with lethal force -- delivering decisive power, with unprecedented economy, lethality and precision.

To do all this – new and extraordinary levels of networked connectivity must be created. Powering Net-centric operations will allow us to dominate <u>any</u>

adversary at any point in the conflict spectrum. The aim is to ensure that commanders at all echelons will be able to make the right decision at the right time and maneuver the right force to the right location – whether that force is a particular military unit, a UAV, or an electronic attack on an adversary's Command-and-Control systems.

Achieving this vision of global Network-Centric Operations demands seamless connectivity between war-planners and war-fighters.

However, one especially difficult obstacle has been the lack of any means to exchange useful amounts of information in a timely manner between these two camps.

Soon though, this situation will change.
The Global Information Grid Bandwidth Expansion and the Transformational Communications Architecture will deliver unprecedented amounts of bandwidth world-wide to DoD.

In the very near future, we will also see embedded communications devices proliferated throughout the tactical battlespace.
While some of these devices will continue to serve traditional soldier-to-soldier communications, many will communicate only chip-to-chip, with no human in the loop.
As tactical systems become more distributed, immersive communications will be the glue that holds the various pieces together, ensuring mission success.

Without question, building these devices and enabling their seamless integration constitutes a major challenge for systems engineers, application designers and network architects.
New ideas in all these areas are essential if we are to fully realize the benefits of immersive communications.

The presentations you are about to hear will provide a view of the challenges and opportunities ATO wishes to pursue in four particular areas:

> At the physical layer...

Can we achieve and ensure rapid and secure data transport, wherever and whenever needed?

Can we provide low probability detection and low probability intercept capabilities to our forces?

...And can we do it with sufficient bandwidth to make it feasible?

> In the "Design of Networks"

Can we transition from the fixed, rigid infrastructure of today to robust, self-forming, ad hoc networks?

In conflicts of the future, mobility is the assumption - not the exception.

> In the "Defense of Networks", we encounter some of our most rapidly evolving problems:

As we become more Net-Centric, we also become more net-vulnerable.

In the future, the most dangerous threats won't necessarily involve only force-on-force combat.
In a Net-Centric System, the network itself becomes a target for the enemy.

Defending against network attack is different than coping with the hackers who try to take down the Internet from time to time.
In a commercial network, you can disconnect if under attack, sit it out, put on a patch and come back online.
In Net-Centric Warfare, you can't unplug.
And the weapons we'll face - such as self-replicating worms, - are getting more sophisticated every day.

(PAUSE) (SLOW DOWN)

Our goal is to develop a self-forming, self-healing network -- (PAUSE)
able to dynamically reconfigure itself, without operator intervention, and sustain itself under attack.

> Fourth and finally, at the Applications layer, our biggest challenges will come in making things work where it counts:

Not in the lab -- but on the battlefield.

As I've said, success is a matter of enabling the right commander to take the right action, using the right assets at the right time.
You will see very specific example of this today when you hear about ATO's Maritime Program - our partnership with the U.S. Navy aimed at bringing Net-Centric Warfare capabilities to maritime conflict.

To further refine these meta-problems - and suggest some leap ahead solutions -- we'll hear from five ATO Program Managers today.

Col. Tom Gibson will discuss the challenges we face in network technology.

Reggie Brothers will review where we need to go in communications technologies.

Anup Ghosh will discuss revolutionary concepts in the area of network defense...

And finally, you'll hear from Captain Don Babcock and Khine Latt about the maritime thrusts that comprise our ATO-Navy partnership.

So as you hear the presentations, keep in mind, when you think networks, think ATO

Now, let me introduce ATO's first speaker, Colonel Tim Gibson...