

ATEC



21st Century Target Control System (21st Century TCS)

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Outline



- Requirement
- History
- Description and Highlights
 - Overview
 - Ground
 - Aerial
- Future Enhancements
- Questions



Requirement



- WSMR requires a remote control system for controlling both aerial and ground targets
- The existing control system, Drone Formation Control System (DFCS) developed in the early 70's using 70's technology
- Existing WSMR legacy remote ground control system was obsolete
- Upgrade to modular control system utilizing state-of-the-art technology



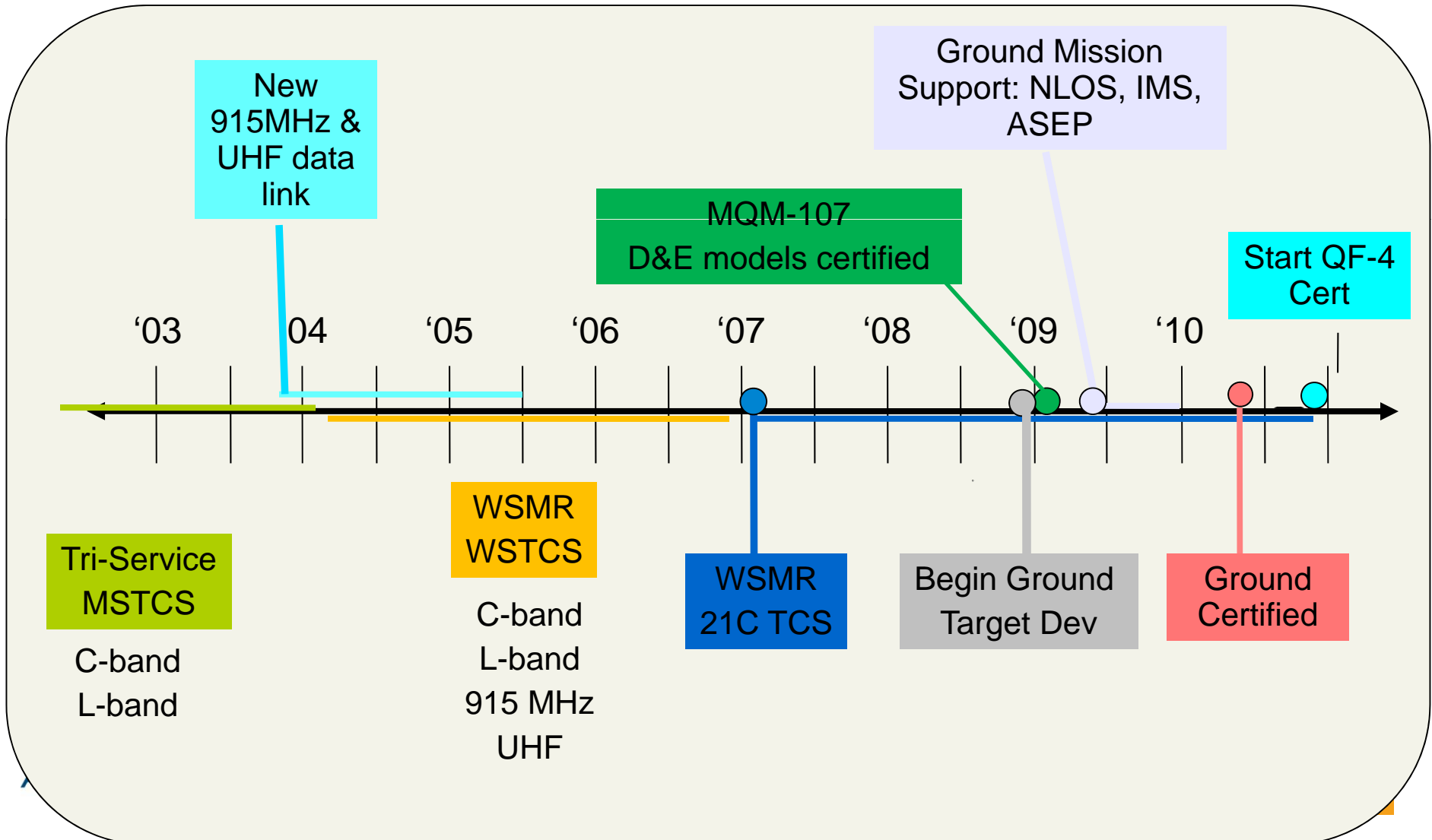
HISTORY



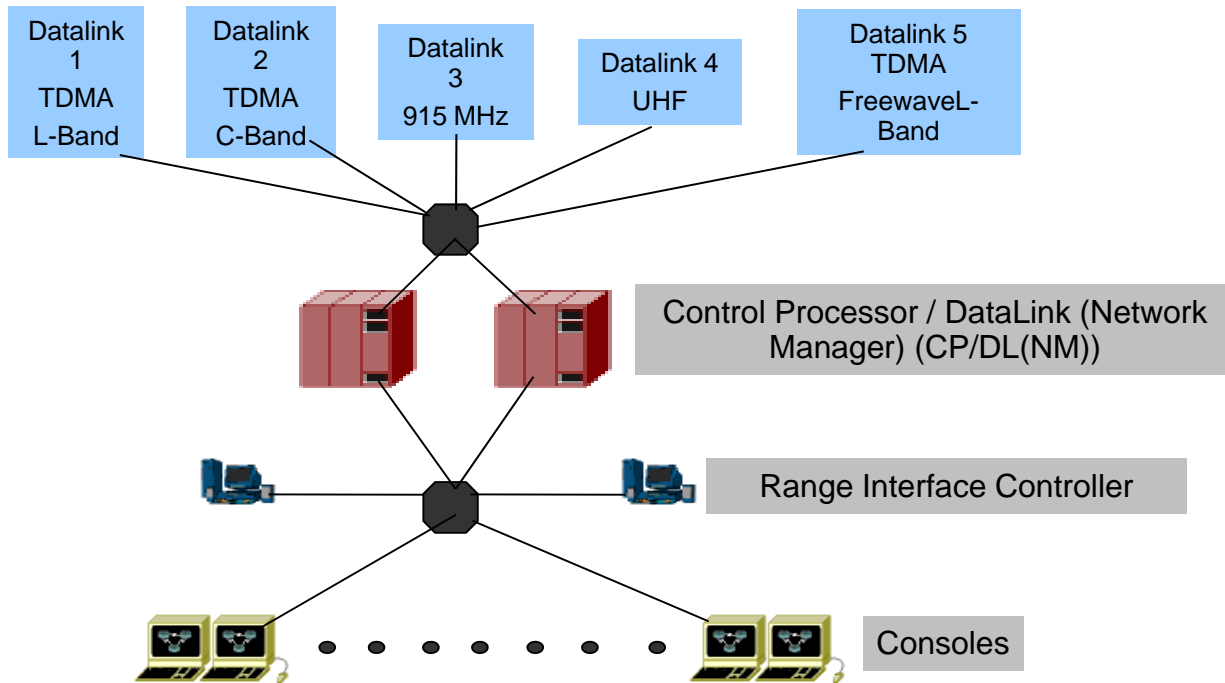
- **MSTCS restructure Jan, 2002 led the Army to develop new TCS as replacement for aging DFCS.**
- **IBM to adopt LINUX as OS of choice starting in 2004**
- **Future support of AIX by IBM not predictable**
- **Initial 21st Century TCS tied to legacy AIX in DFCS**
- **Port of datalink network function to TCS**
- **Need to eliminate multiple computers and port system into a single multiprocessor computer**



HISTORY



Description





Qt Based GUI



The screenshot displays the WSTCS (Weapon Simulation Test Cell) interface. At the top, there are menu tabs for 'Config', 'Mission', and 'DFCS'. Below the menus is a toolbar with icons for file operations and a play button. The main workspace is divided into several sections:

- Consoles:** A row of eight computer icons labeled 'Cons 7' through 'Cons 14'. The first three (Cons 7, 8, 9) have a green 'MCC' (Mission Control Computer) icon on top.
- Targets:** Three target icons are shown: a BMP (ID: 9, Address: 211), another BMP (ID: 10, Address: 212), and a TRUCK (ID: 11, Address: 113).
- Communication Links:** Blue lines connect the MCCs to the targets. Red lines connect the targets to the communication links below.
- Communication Links:** A row of eight antenna icons labeled 'L-Band', 'GV L-Band', 'UHF', '915 MHz', 'C-Band', 'Sim L-Band', 'Sim GV L-Band', and 'Sim 915'.
- Target Lists:** On the right side, there are two scrollable lists: 'Ground Targets' containing a 'TRUCK' and 'Aerial Targets' containing a 'T72'.
- Log Window:** At the bottom, a text area displays a series of error messages: '09 Incorrect Auto Segment' repeated ten times.



TCS HDD Console



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Description: *Ground Target Control*

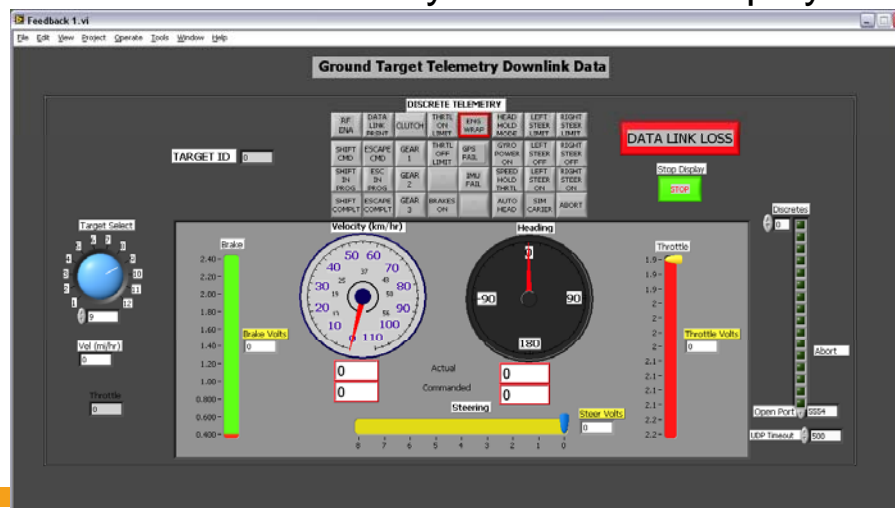
Compact Design



New Control System Architecture



Vehicle Telemetry Information Display



Description: *Ground Target Control*

Vehicles Currently Configured



T-72



5-ton Truck



Light Truck



BMP



2S3



Sedan



21st Century TCS Mobile Van



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US Army White Sands Missile Range

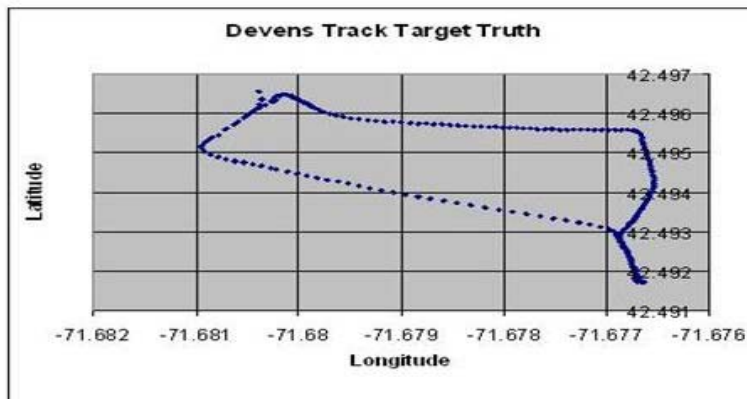


Highlights: *Ground Target Control*



Intelligent Munitions System (IMS)-Support Fort Devens, MA, Feb 2009.

- Team support at Fort Devens, MA 17 -27 Feb 2009. Conditions of track Sat 7 Feb 2009.



- Track was approximately 626 meter long and 10 feet wide.
- Ice and Snow made for poor traction of two 1997 black Nissan trucks

Two vehicle convoy mission @ Zumwalt Track 7 July 2009 using 21st Century TCS from B312 (95 mi. from test site)





Automated Analysis Environment

Applications Places System 1:05 PM

damsmain

TCS Data Analysis Menu System

- XY Plot Menu
- Overlay Plot Menu
- Overlay Stairs Plot Menu
- YY Plot Menu
- Stacked Plot Menu
- N Stacked Plot Menu
- Time History Plot Menu**
- Discretes Plot Menu
- Time History Plot w CLI Menu
- Algorithm Plot Menu
- Algorithm Plot w CLI Menu
- Batch Processing Plot Menu

Select Mission: imutest29apr08final

Select Data: ards

Invoke

damsthpop

TCS Time History Plot Menu

Select Target ID: 228 groundtarget952

Select Message Group: 253 ARDS 677

Select Plot: ALTITUDE

Plot

oracle@octave:... MATLAB 7.3.0 (... [Editor - /home/... damsmain damsthpop Starting Take S...



Innovations and Milestones



- **Dynamic Speed Control (5 – 65 mph)**
- **Auto vehicle spacing (30 – 100 m)**
- **Formation control of different vehicle permutations**
- **Multiple formation support**
- **Auto launch of formation**
- **Multiple Safety Options**
 - **Collision Avoidance**
 - **Remote Abort**
 - **Master Stop (Mission Pause)**
 - **Automatic slot allocation**



Innovations and Milestones



- Sub-meter (60 cm) GPS accuracy
- Automatic generation of ground path based on GPS data
- Over-the-air modifications of vehicle configurations
- Health of systems display capability
- Logging and state of the art analysis capability
- Ability to change segment velocities in real time
- Mobile systems capability

Description: *Aerial Target Control*

Targets to be certified for control

MQM-107



Models: D*, E*, IAP
Datalink: UHF

QF-4



Datalink: 915MHz

* MQM-107 D and MQM-107 E have been certified



Highlights: *Aerial Target Control*

- Certified UHF MQM-107 D & E Fall of '08*
- Scheduled UHF MQM-107 Integrated Avionics Package (IAP) flights within next 6 months
- QF-4 testing FY11



Future Enhancements

- Touchscreen (Haptic feedback) user interface
- New actuator control
- Integration of surrogate targets
- UAV integration
- Threat management system capability
- New kill switches
- More efficient vehicle instrumentation



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US Army White Sands Missile Range



Questions??