Common Logistics Operating Environment

Operational Concept Description for Common Logistics Operating Environment (CLOE) Increment 1 Implementation for Ground Vehicles

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CLOE Operational Concept Description
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1 Scope

1.1 Identification

The Operational Concept Description (OCD) for Common Logistics Operating Environment (CLOE) Increment 1 Implementation contains scenarios showing the flow of information as it traverses the system within a Brigade Combat Team (BCT). The scope of this implementation is limited to Stryker Brigade Combat Team (SBCT) and Heavy Brigade Combat Team (HBCT) environments. Operational scenarios presented in this document for implementing Increment 1 are organized into three areas:

- Combat Readiness
- Field Maintenance Including Critical Repair
- General Supply Operations for Bulk Fuel

1.2 System Overview

In their final form, CLOE capabilities will automate many of the manual logistics reporting functions and interaction with the sustainment system. Increment 1 fielding includes enabling functions that integrate reporting of platform-level equipment condition, and status of platform consumables with the Army's logistics enterprise environment. The scenarios include end-to-end threads integrating the Increment 1 enabling functions with existing processes.

1.3 Document Overview

This document is intended to provide an overview of the functionality necessary to implement CLOE Increment 1 capabilities with a BCT. A brief description of the major family of systems making up the BCT is given so the reader can understand the systems included in Increment 1. Operational scenarios are presented to provide a clear understanding of the necessary information flows under routine conditions.

The architecture artifacts within this document are consistent with the Army Integrated Logistics Architecture (AILA), and provide detailed scenarios which support the overarching architecture. The OCD is developed from the AILA Operational Node Connectivity Description (OV-2), Operational Information Exchange Matrix (OV-3), Operational Activity Model (OV-5), and the Operational Event-Trace Description (OV-6c). References to specific AILA activities are provided alongside the Increment 1 scenarios in Section 5 where applicable.

2 Referenced Documents

This paragraph lists the number, title, revision, date, and source of all documents referenced in this document.

ITEM	TITLE
1	FM 4-90.1 Heavy Brigade Combat Team (HBCT) Logistics March 15, 2005
2	FM 3-21.31 Stryker Brigade Combat Team (SBCT) March 13, 2003
3	Army Integrated Logistics Architecture (AILA) version 1.1 February 10, 2006
4	Army Maintenance Transformation Concept, TRADOC Pamphlet 525-100, 4 Nov 2005

3 Goals and Objectives

3.1 CLOE Goals and Objectives

The goals of the CLOE program are to improve mission readiness, reduce the footprint of logistics assets, and lower life cycle costs of Army systems. To accomplish this, CLOE imposes a set of standards, interface definitions, and information protocols that implement an overarching logistics operating concept. As the CLOE is propagated throughout the service, the Army will be provided with an integrated picture of asset mission readiness and integrated management of logistics activities.

3.2 Implementation Objectives

CLOE objectives and resulting requirements are to be implemented over a series of incremental fielding's, with each subsequent fielding providing additional capability. Appendix 6.2 provides a summary of planned capabilities.

3.2.1 Increment 1 Implementation Objectives

Increment 1 provides for an early fielding of a small segment of CLOE enabled capabilities in either the HBCT or SBCT environments. These capabilities provide automated reporting of platform equipment status and fuel levels to the Command and Control (C2) and logistics communities, as well as automatic generation of a Call For Support (CFS) informational message to logistics for critical platform faults. These new capabilities are intended to demonstrate integration of platform, C2, and logistics systems to provide a significant improvement in the timeliness and accuracy of logistics situational awareness and common operating picture. They replace a manual process of entry at the Force Battle Command XXI Brigade and Below (FBCB2) and demonstrate the interoperability of systems in a net-centric environment in accordance with CLOE objectives. The objectives of Increment 1 are therefore to rapidly field a set of CLOE enabled capabilities, provide an opportunity for the user to evaluate these capabilities in the real world, and collect feedback for future increments.

4 CLOE Increment 1 Implementation System of Systems (SOS) Description

4.1 System Overview

Increment 1 implementation will operate in an environment comprised of an integrated SOS, including the platforms deployed through the Heavy and Stryker brigades, Command, Control and Communication Systems (C3) and Logistical Support Systems. Figure 1 illustrates the relationship of these families of systems and identifies the specific systems of interest for Increment 1. Figure 2 and Figure 3 illustrate the anticipated off-platform architectures for the SBCT and HBCT respectively.

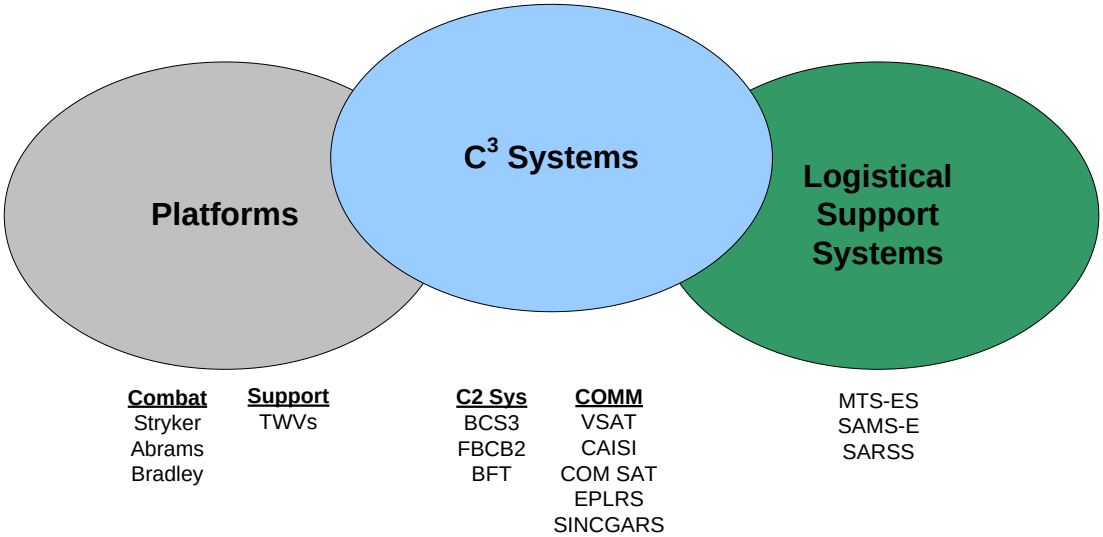


Figure 1 Increment 1 System of Systems

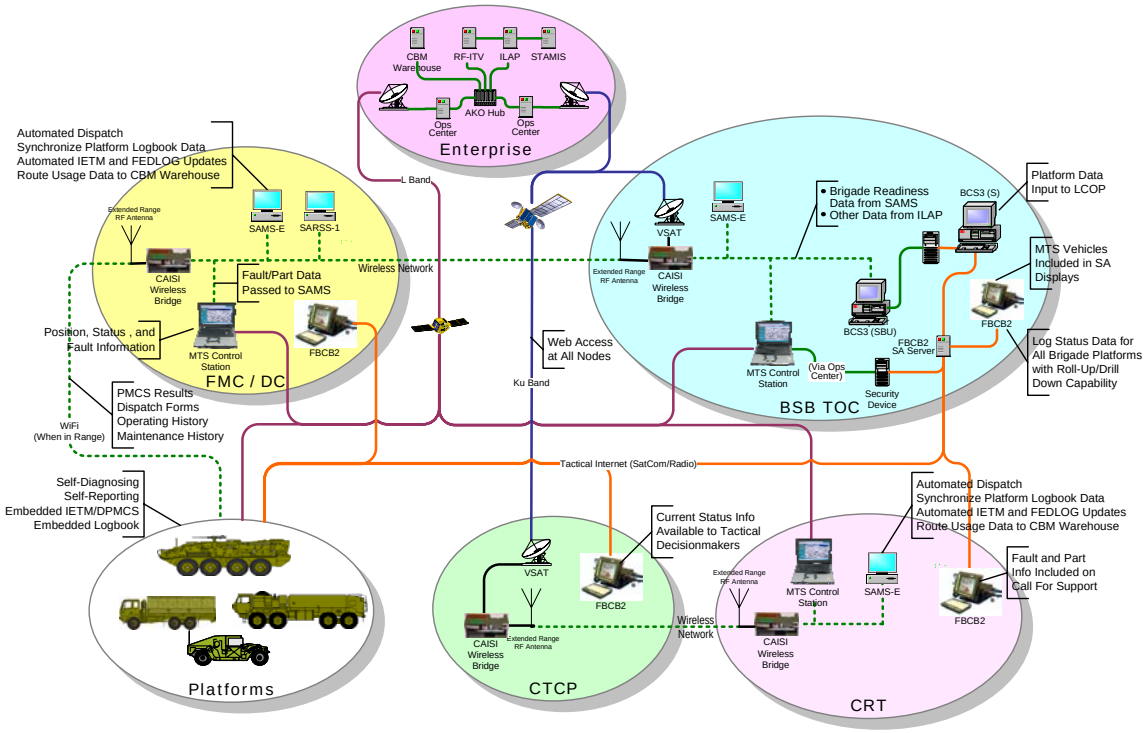


Figure 2 SBCT Off-Platform Architecture

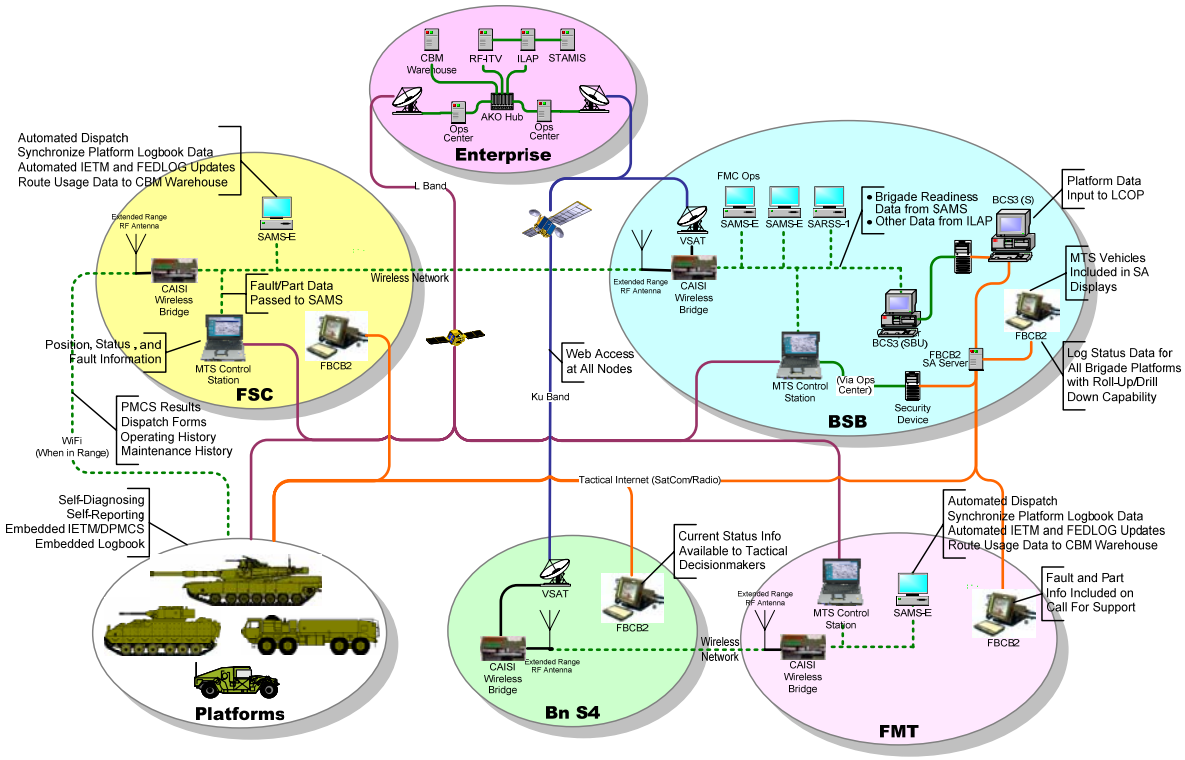


Figure 3 HBCT Off-Platform Architecture

Figure 4 identifies the systems that are modified to support the Increment 1 implementation and summarizes the added capability.

CLOE Increment 1 Implementation System Enhancements		
System	**Modified For Increment 1 Fielding**	**Enhancements**
Platforms		
Stryker	Y	Logistics information transferred from the Platforms to FBCB2 system Fuel, Equipment and LRU status (ICD message #s 22,23,25,37)
Bradley	Y	
Abrams	Y	
TWV's	N	
Command & Control Systems		
BCS3	N	No interoperability between BCS3 and FBCB2
FBCB2	Y	Rolls up equipment status and logistical information from the platforms and distributes via a LOG distribution list within the brigade. SITREP, CFS, and LOGSTAT (VMF messages: K05.14,K07.12,K07.03)
Logistics Support Systems		
MTS	N	MTS-ES not available to support TWVs for increment 1
SAMS - E	Y	SAMS - E replaces SAMS (rehost) and ULLS-G functionality.
SARSS	N	
Communication Systems		
VSAT	N	Existing communication systems expected to support planned functionality.
CAISI	N	
Comm SAT	N	
EPLRS	N	
SINCGARS	N	

Figure 4 Summary of Increment 1 System Enhancements

The following sections describe the components for each of the combat and support platforms, C2 systems, communication systems, and logistics support systems.

4.2 Combat Platforms

Ground Combat Systems (GCS) of interest for Increment 1 include the Stryker, Bradley and Abrams platforms. Figure 5 below provides a CLOE compliant functional architecture for a ground combat system platform. The functionality shown represents a fully compliant platform architecture that will support AILA requirements. The sections that follow describe the Increment 1 functional architectures applicable to Stryker, Bradley, and Abrams platforms. Objective functionality identified in Figure 5 which is not required by a particular platform for Increment 1 is lined out in their individual functional architecture figures.

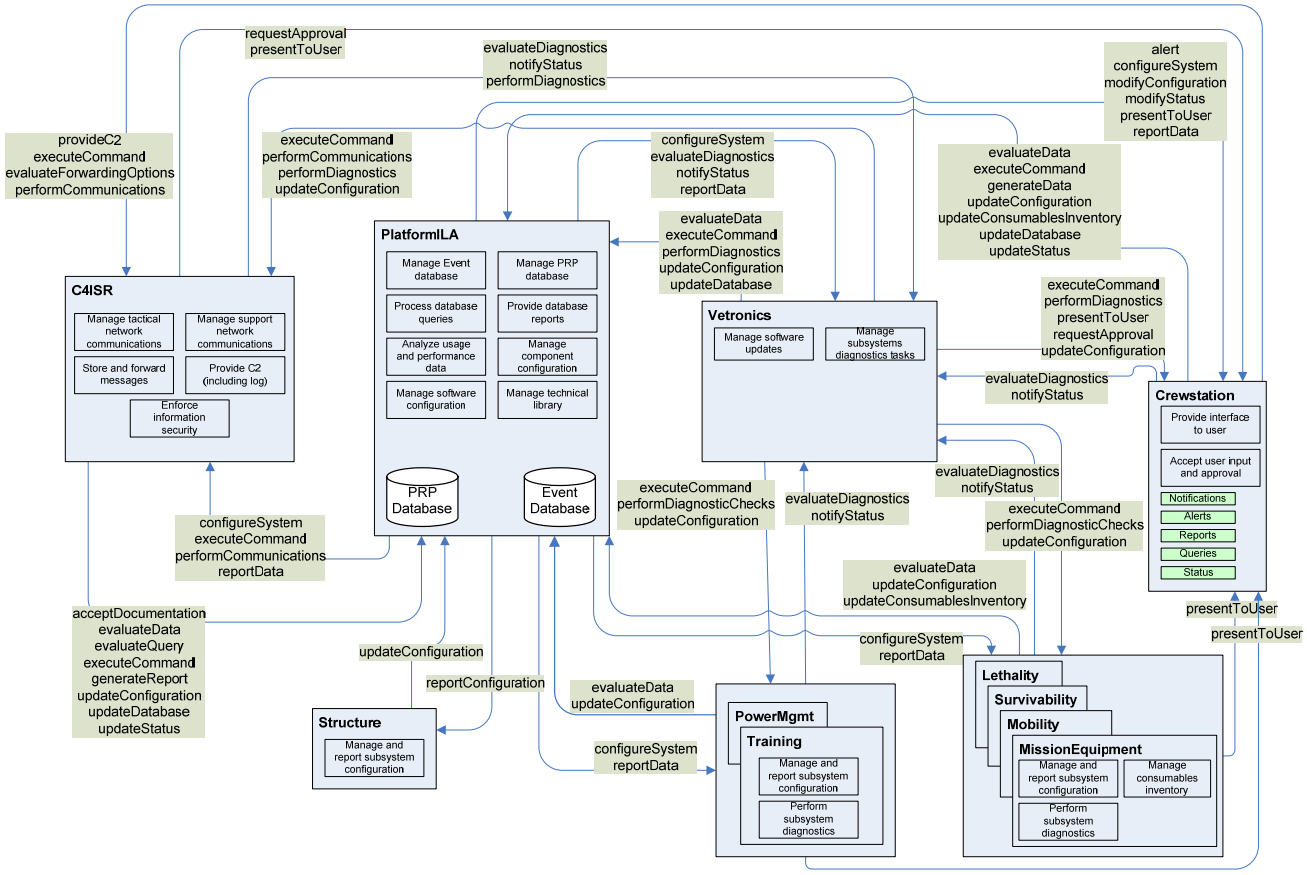


Figure 5 Ground Combat System Functional Architecture

4.2.1 Stryker

Figure 6 below depicts the functional architecture for the Stryker platform, showing the applicable components of the CLOE compliant GCS platform for Increment 1.

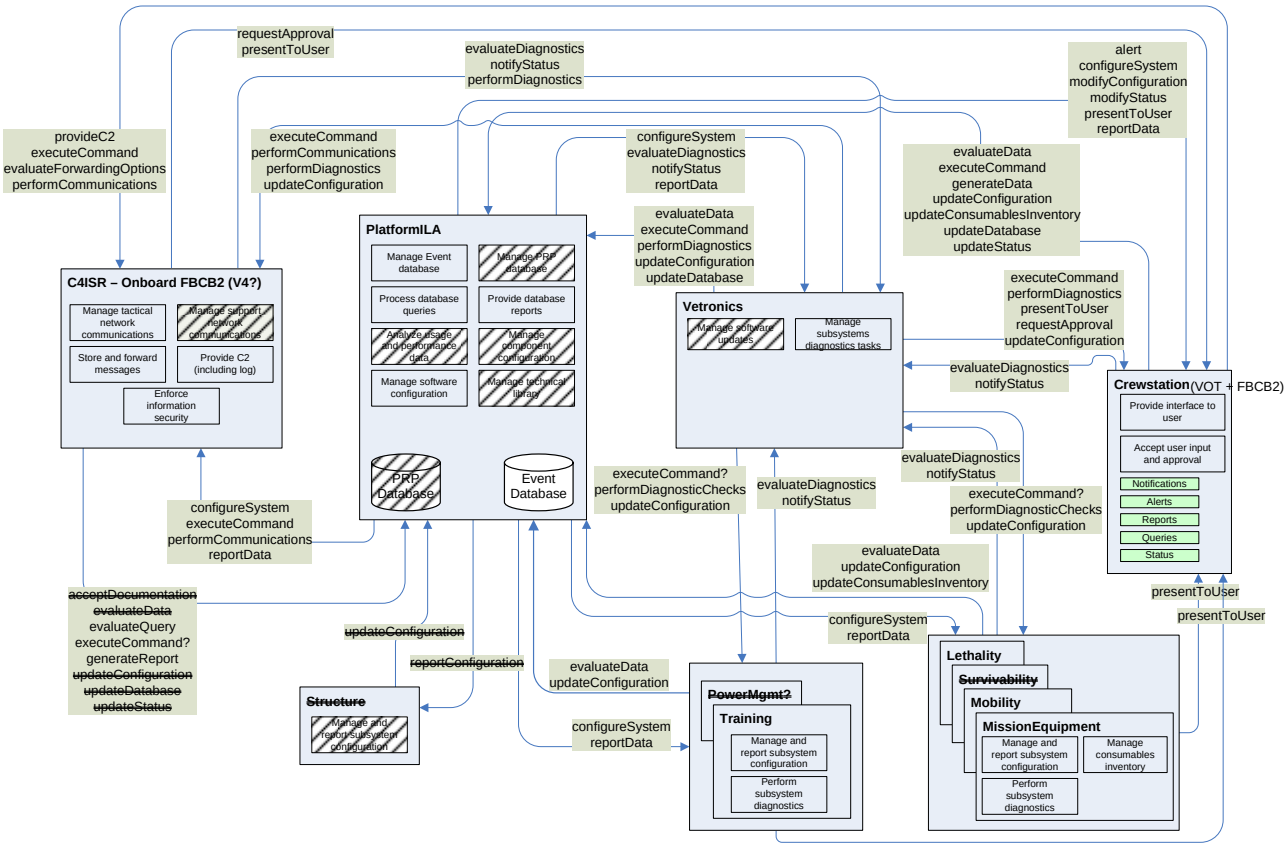


Figure 6 Stryker Platform Functional Architecture

4.2.2 Bradley

Figure 7 below depicts the functional architecture for the Bradley A3 platform, showing the applicable components of the CLOE compliant GCS platform for Increment 1.

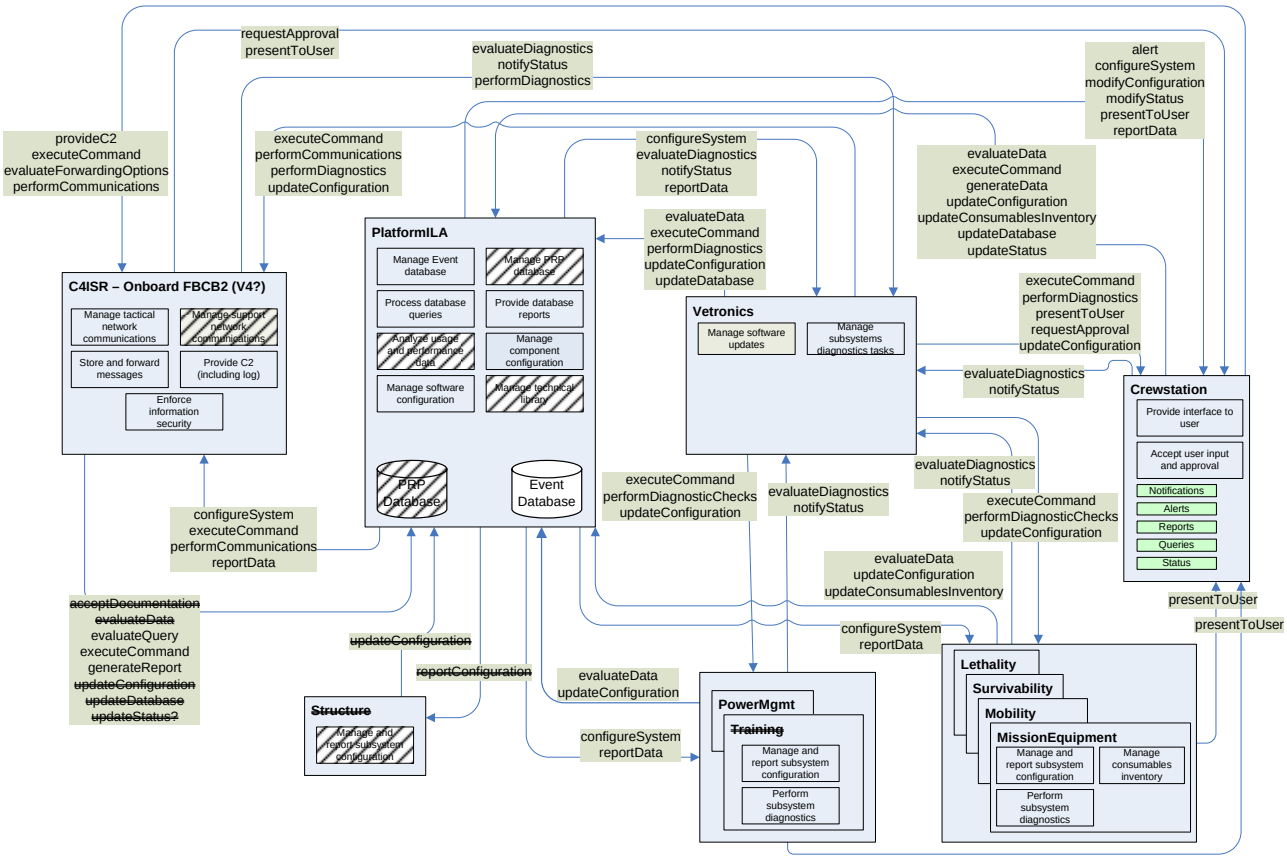


Figure 7 Bradley A3 Platform Functional Architecture

4.2.3 Abrams

Figure 8 and Figure 9 below depict the functional architecture for the Abrams M1A1 AIM and M1A2 platforms respectively. They illustrate the applicable components of the CLOE compliant GCS platform for Increment 1.

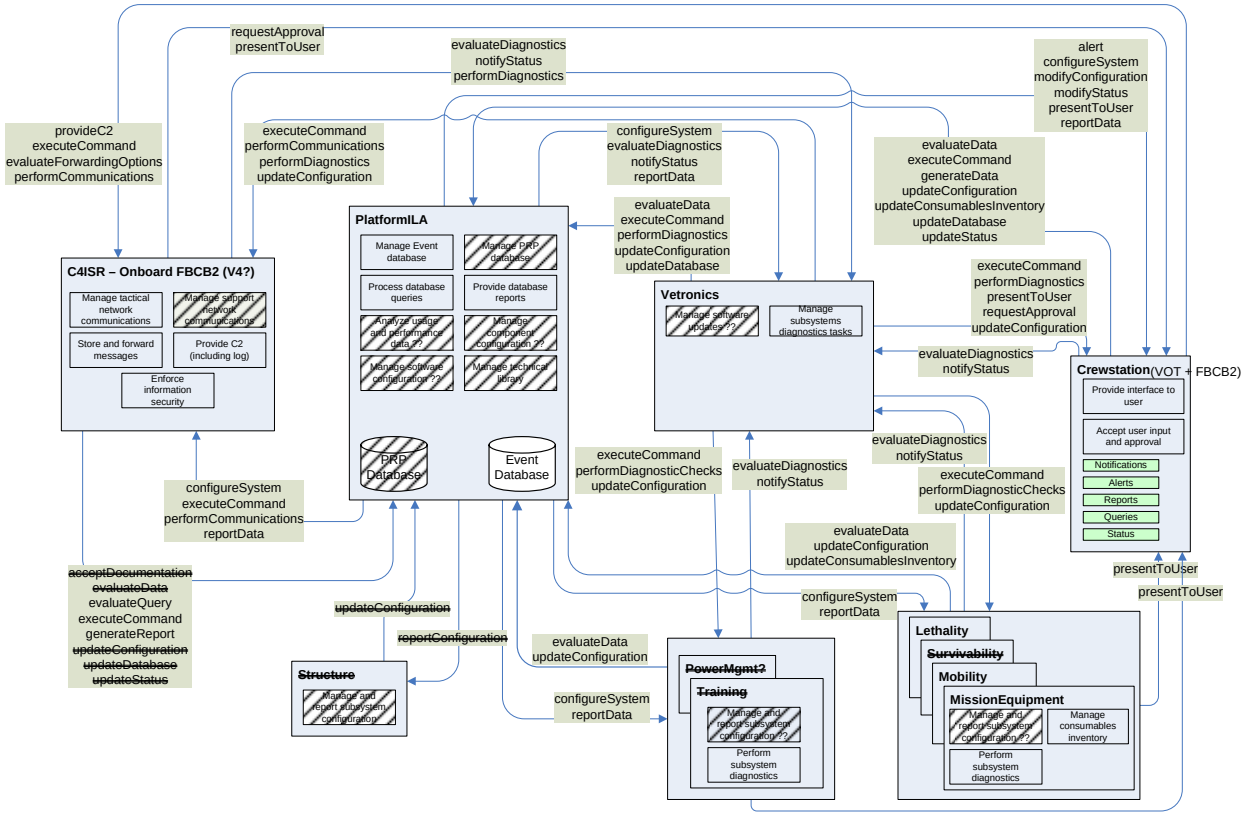


Figure 8 Abrams M1A1 AIM Platform Functional Architecture

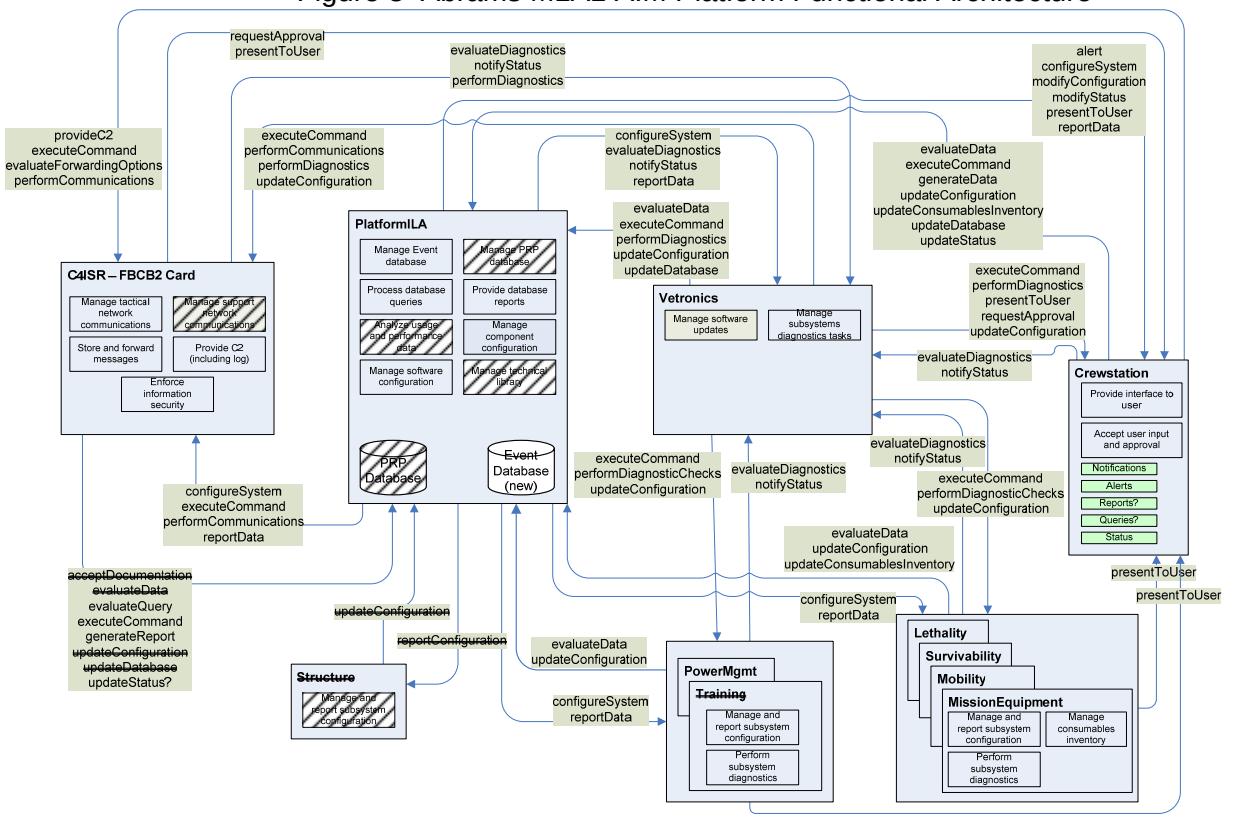


Figure 9 Abrams M1A2 Platform Functional Architecture

4.3 Support Platforms

4.3.1 Tactical Wheeled Vehicles (TWVs)

TWVs are made up of Heavy, Medium, and Light tactical trucks and their respective variants. These vehicles are the primary support platforms used for the transportation of supplies and personnel to carry out logistics operations. The underlying electronics architecture for these vehicles is shown in Figure 10.

TWVs furnished with FBCB2 equipment will provide engine diagnostic and fuel information for combat power (SITREP), logistics (LOGSTAT), and deadlined repair requests (Call for Support). TWVs that are not furnished with FBCB2 will not be a part of the Increment 1 implementation of CLOE, since integration of the vehicle architecture into the CLOE is dependent on the implementation of the MTS which will not be available in time to support this implementation.

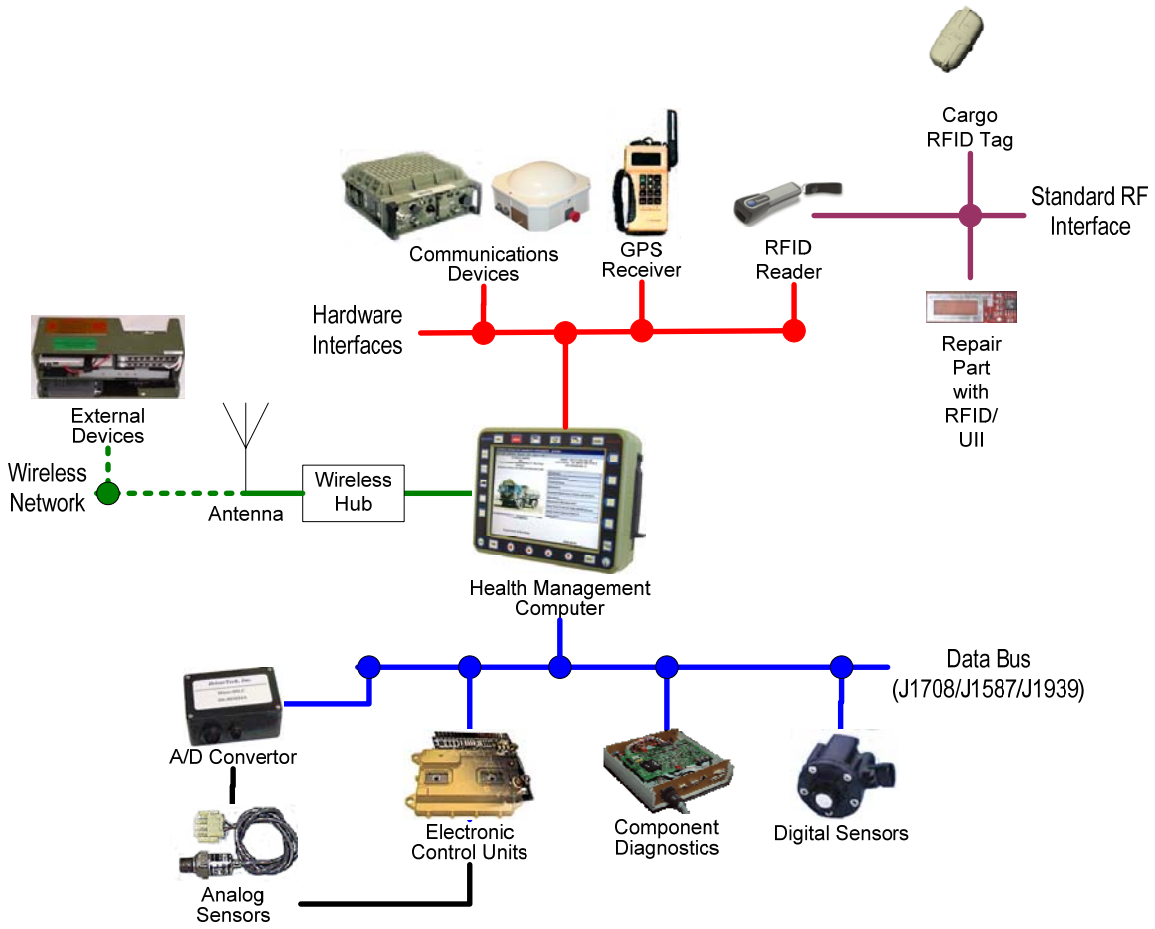


Figure 10 Tactical Wheeled Vehicle Architecture

4.4 Command and Control Systems

4.4.1 Battle Command Sustainment Support System (BCS3)

Figure 11 Battle Command Sustainment Support System

The Battle Command Sustainment Support System (BCS3) is the Army's maneuver sustainment C2 system used to fuse sustainment, in-transit visibility, and Force level information data to aid commanders in making critical decisions at all echelons for maneuver sustainment support. It is modular, tailorable, and scaleable to meet the full spectrum of operations and interoperates with the Radio Frequency In-Transit Visibility (RF-ITV) system, Army Battle Command System (ABCS) and other Army and Joint systems. BCS3 provides the latest available, continuous graphical representation of the current situation within the Area of Operations (AO) to include all logistics unit locations and unit status. The situation is displayed over topographic details selected by the user from a menu of available mapping features. BCS3 provides the logistics portion of the Common Operating Picture (LCOP) on Maneuver Control System and provides the maneuver sustainment commander with enhanced briefings and data management capabilities. The current logistics data is augmented with analytical and decision support tools that enable the commander to make informed decisions rapidly to support current and follow-on actions.

There are no planned changes to BCS3 in the Increment 1 fielding, however, BCS3 will benefit from more timely information flow from forward units.

4.4.2 Force XXI Battle Command Brigade and Below (FBCB2)

Figure 12 Force XXI Battle Command Brigade and Below

FBCB2 system consists of software and hardware tools that provide supporting battle command near-real-time brigade level situational pictures, down to the individual Soldier and single platform level. The system integrates over 1,000 subscriber sets covering the brigade's entire area of interest, including Bradley or Stryker combat vehicles, M1A2 tanks, AH-64D, OH-58D and Black Hawk helicopters, artillery and combat support elements etc. The system relies on advanced communications devices, which integrate position navigation and reporting capability such as Global Positioning System (GPS), integrated Single Channel Ground and Radio System (SINCGARS) or Enhanced Position Location Reporing System (EPLRS).

FBCB2 supports commanders at lower echelons with real-time situational awareness, target identification and graphical combat area displays. The system's situational awareness component displays the geographical location of all weapons, platforms, Soldiers, command posts, and other facilities based on actual locations reported automatically by the system's subscribers in near real-time.

FBCB2 subscribers automatically post their position and status messages, via wireless or satellite radios, to nearby subscribers as well as to central hubs at the Brigade's Command Post. The information is transmitted over wireless and secured internet, which enables every member of the network receiving relevant information on nearby friendly forces, and creates common, constantly updated digital maps of the battle space, shared by all the combat echelons below or above the brigade, as well as nearby forces or joint forces. This common picture displays positions and details about enemy forces, and specific targets, friendly and own forces, and logistics information. To support such operations, the system relies on a number of common messages, and the delivery of textual messages.

Planned improvements through Block II software in support of the Increment 1 fielding include:

- FBCB2 will support automated transfer of logistics information from combat platforms (Stryker, Bradley Abrams, TWV) using SITREP, CFS and LOGSTAT messages. Information includes fuel quantity, vehicle health, Line Replaceable Unit (LRU) status and supporting diagnostic information.
- Provide the capability to create a logistics distribution list for receivers of the platform status information.

- Combat Platform Status (SITREP) information will be automatically updated and displayed through a graphical user interface (GUI) “Gumball” display for fuel and equipment status.

4.5 Logistics Support Systems

4.5.1 Movement Tracking System (MTS)

Figure 13 Movement Tracking System

MTS is a commercial off-the-shelf product that provides vehicle operators and their leaders with digital National Geospatial-Intelligence Agency maps, GPS location data, and Long Band (L-band) satellite two-way text messaging. MTS computer systems come in two configurations: a mobile system that can be mounted in any tactical wheeled vehicle and a laptop control station for use at platoon, company, battalion, or brigade headquarters. The system enables Soldiers to see the position of, and communicate with, other MTS-enabled vehicles and control stations. Leaders can pass critical information, route and mission changes, and other information to their Soldiers while the Soldiers are on the road conducting missions. An embedded Radio Frequency (RF) Identification (RFID) interrogator can read active RF tags placed on cargo or containers loaded onto the back of a vehicle. Active RF tag data, read by the MTS device, is transmitted to the MTS server which distributes the data to MTS control stations. The MTS server/hub also transmits this active RF tag data to the RF-In Transit Visibility (RF-ITV) server. Other control stations can track cargo as it moves across the battlefield and commanders can redirect shipments on the move as the mission dictates.

4.5.2 Standard Army Maintenance System – Enhanced (SAMS-E)

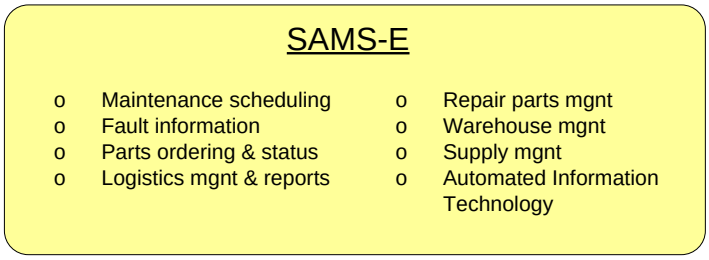


Figure 14 Standard Army Maintenance System – Enhanced

SAMS-E replaces Unit Level Logistics System - Ground (ULLS-G), SAMS-1, and SAMS-2 by incorporating the Windows GUI operating systems (Windows 2003/XP), which satisfies Headquarters, Department of the Army (HQDA) G3 Network Control (NETCON) Directive to move all systems off MS DOS, Windows 2000 and Win NT; and to merge ULLS-G functionality into SAMS-E.

SAMS-E automates unit level Class IX supply, maintenance readiness and unit status reporting functions; and day-to-day weapon system and sub-component readiness status, maintenance and related repair parts information, and management functions from the support Field and Sustainment Maintenance concept (Two Levels of Maintenance).

SAMS-E supports Combat Service Support (CSS) Table of Organization and Equipment (TOE) organizational level maintenance elements, Field and Sustainment maintenance shop production activities and is considered a mission critical system. For combat support and combat service support elements the SAMS-E systems provide consolidated maintenance and repair parts data and are generally located at the Field Maintenance Teams (FMT), Combat Repair Teams (CRT), Forward Support Companies (FSC), Field Maintenance Companies (FMC), Brigade Support Battalions (BSB), Combat Sustainment Support Battalions (CSSB), Separate Battalions andBrigades, Sustainment Brigades, Component Repair Companies (CRC), Support Maintenance Companies (SMC), and higher level materiel management organizations. SAMS-E is anticipated to be fielded in time to support Increment 1.

4.5.3 Standard Army Retail Supply System (SARSS)

SARSS is a Combat Service Support peacetime and wartime logistics system. SARSS improves supply management and stock control at the Army retail level. Three interrelated sub-systems comprise SARSS: SARSS-1, SARSS- 2AC/B and SARSS-Gateway. SARSS-1 processes time-sensitive but unclassified data for receiving, storing, and issuing at the Supply Support Activity (SSA) level. SARSS-2AC/B supports management functions such as excess disposition and redistribution at the Distribution Management Center (DMC), at the Theater Sustainment Command (TSC), Expeditionary Sustainment Command (ESC), and Sustainment Brigade Level. SARSS-Gateway offers improved communications and advanced automation functionality that allows users to place orders on the Source of Supply (SOS) the same day the customer produces them. SARSS also interfaces RF-ITV for tracking of supply fulfillment. No changes are planned to the SARSS systems for increment 1 fielding.

4.5.4 Radio Frequency In-Transit Visibility (RF-ITV)

The RF-ITV utilizes Radio Frequency (RF) technology to track materiel that is in-transit. By placing an "RF tag" on a container, materiel can be pinpointed to a location when it passes through a checkpoint. The RF-ITV was designed to provide in-the-box visibility and support total asset visibility by tracking materiel in the logistics pipeline. RF-ITV servers provide ITV information on in-transit shipments.

4.6 Communication Systems

4.6.1 Combat Service Support Automated Information Systems Interface (CAISI)

CAISI provides commercial and tactical wired or wireless local area network (LAN/WLAN) connections for CSS Standard Army Mnaagement Information System (STAMIS) users which can be provided from a variety of locations; in-garrison or on the battlefield, ranging from the BCT and Brigade Support Areas (BSA) to the fixed facilities within the tactical theater. CAISI provides commanders, managers, and logisticians an interface device supporting CSS doctrine during times of peace and war. CAISI can be used as a concentrator or interface device for multiple STAMIS business applications and emerging system clients/users. It will connect between the circuit and packet sides of satellite communications provided by Joint Node Network (JNN) or more commonly CSS VSAT and provide user's access to Non-Classified Internet Protocol Routed Network (NIPRNET). CAISI is capable of providing systems connectivity and support 24/7. Maintenance is ‘as required’ by component failure or adding additional users. The system can be shutdown and made ready for transport in 30 minutes.

CAISI is designed to provide encrypted wireless data communications connectivity per Army Regulation (AR) 25-2, Information Assurance, compliant-sensitive information for logistics systems in a deployed a brigade support area. This can be doubled by using the CAISI Repeater Module (CRM). CAISI uses a network hub to allow multiple users to connect to a network interface. The hub connects to an encryption device for Federal Information Processing Standards (FIPS) 140-1 compliant transmissions and uses software for FIPS 140-2 compliant intrusion detection. The encryption device is connected to a wireless bridge or a client that uses Institute of Electrical and Electronics Engineers (IEEE) 802.11b/g compliant 2.4 gigahertz (GHz) bandwidth to transmit and receive data at 11 megabytes per second (Mbps). Using a portable tower and antenna, CAISI transmissions are sent and received in a clear line-of-sight (LOS) range of up to four miles/seven kilometers and up to eight miles, using the available CRM provided in the System Support Representative (SSR) Accessory Kit.

CAISI allows one-to-many connectivity for unclassified clients/STAMIS users. One CAISI fielding may currently support a maximum of seven computer users connected to a CAISI Client Module (CCM), 14 to a CAISI Bridge Module (CABM), and as many as eight CCMs to a CABM without degrading radio data signal frequency at the central root node. One CABM is designated at each unit as the central/root node. This node controls the LAN parameters and traffic for that service area.

4.6.2 CSS Very Small Aperature Terminal (VSAT)

CSS VSAT is a small, software-driven, 1.2 meter satellite dish earth station used for reliable transmission of unclassified to sensitive network data, video, and/or Voice over Internet Protocol (VoIP) communications via satellite and access to NIPRNET. It is a commercial satellite based, wide area, data network that supports current and future logistics information systems for deployed and in-garrison units until

Warfighter Information Network - Tactical (WIN-T) is fielded worldwide. It requires no specialized staff or additional technology to operate.

CSS VSAT communications provide error-free digital data transport services and high network reliability. VSAT services are delivered through the use of Ku band geostationary satellites for video, voice, fax, and data transmissions. VSAT uses a star network with the use of satellite earth stations that rely on a large central hub. They can be configured in both one-way (receive only) and two-way (send and receive) configurations. VSAT provides or is compatible with lease-line backhaul support; Code Division Multiple Access (CDMS), Single Carrier Per Channel (SCPC), and Time-Division Multiple Access (TDMA) technology. VSAT uses global positioning system (GPS) software to automatically point the dish antenna to receive a local internet access point that can be connected to a LAN such as a CAISI Bridge Module (CABM).

VSAT use has been identified as an effective rapid-halt and quick movement capable satellite communications (SATCOM) hardware communications system solution in a variety of geographical environments. Current component dimensions are the most reduced, packaged, and mobile of any commercially available. VSAT hardware is stored in four transit cases that are transportable as restrained cargo over land, sea, and air with necessary packaging and tie-down provisions. A trained operator can setup VSAT and be operational in 30 minutes or less. The four cases weigh as follow: Indoor Equipment case - 93 pounds (lbs), Antenna Pedestal case - 170 lbs, RF Equipment case - 121 lbs, and Reflector case - 135 lbs. Combined weight for all four cases of VSAT equipment totals 519 lbs.

4.6.3 Enhanced Position Location Reporting System (EPLRS)

The AN/TSQ-158, EPLRS provides a computer controlled communications network which transmits digital information to support tactical operations on the battlefield. EPLRS provides two major functions; data distribution, and position location and reporting. Speed of service and throughput requirements for priority data users and reliable data communications are significant data-delivery features. Computing and reporting position location, navigation aids, and friendly identification are the key battlefield visibility and synchronization features.

EPLRS is a synchronous TDMA system that provides the basic tactical functions of identification, position location, and navigation information automatically to a centralized Net Control Station (NCS). It reports this information to commanders and supported users within the EPLRS community upon request. It provides near-real-time data communication support to weapon system sensors and other Battlefield Automated Systems.

4.6.4 Single Channel Ground and Airborne Radio System (SINCGARS)

SINCGARS is the primary Combat Net Radio (CNR) designed primarily for voice command and control for the infantry, armor, and artillery units. It is a VHF-FM radio system that operates on any or all of the 2,320 frequencies between 30 and 87.975 MHz in 25 kHz increments. SINCGARS employs frequency hopping, as its primary means of communications against a hostile (jamming) environment. SINCGARS is capable of processing voice, analog and digital data in either the frequency hopping or single channel mode.

4.6.5 Commercial Satellite – L band

Commercial satellite systems are employed to provide communication for the MTS, and also used for Blue Force Tracking (BFT). These L-band satellite links allow over-the-horizon communication between the TWVs and their corresponding base stations. The systems provide near-real-time short-text messaging that is limited to 100 characters. L-band was selected for its ability to penetrate rain, sand, and light vegetation to a much greater degree than the smaller aperture Ku band. It's also not affected by propeller wash, allowing it to be used on helicopters.

5 Operational Scenarios

Three operational scenario areas are presented that address the impact of the platform enabled parameters on the CLOE for the Increment 1 implementation. They include a Combat Readiness assessment provided through a combat power summary, Field Maintenance for the repair of critical platform faults, and Supply Operations for the reporting of on-hand fuel. Where appropriate, the three scenario areas are delineated separately for both the HBCT and SBCT environments, since these organizations differ slightly from one another along with the flow of information in the field. The flow of information through the chain of command is derived from available Field Manuals (FM) and is appropriately referenced along with the AILA activities corresponding to the scenario steps. It is understood that some of these processes may be tailored through the Commander's Standard Operating Procedures (SOP), provided they do not violate ARs. Second, a standardized routing of message is presented that will permit automation, fit within doctrinal constraints and normal practices, and fulfill end-to-end objectives with a reasonable trade-off between communication traffic and number of individuals informed. It is assumed that SOP can modify the actual routing of a message to reduce communication traffic (by reducing information copies) or increase

distribution (by increasing information copies).

5.1 Command and Control – Combat Readiness Scenario

The scenario for providing combat power is the same for both HBCT and SBCT. Therefore, only one scenario is shown.

5.1.1 Provide Combat Power Summary

Purpose :
This scenario describes the logic flow of providing combat power summary, starting at the platform level and ending at the Brigade (BDE) Tactical Operations Center (TOC). This scenario includes roll-up status of subordinate units and drill-down exposure of subordinate unit's details.

Notes:

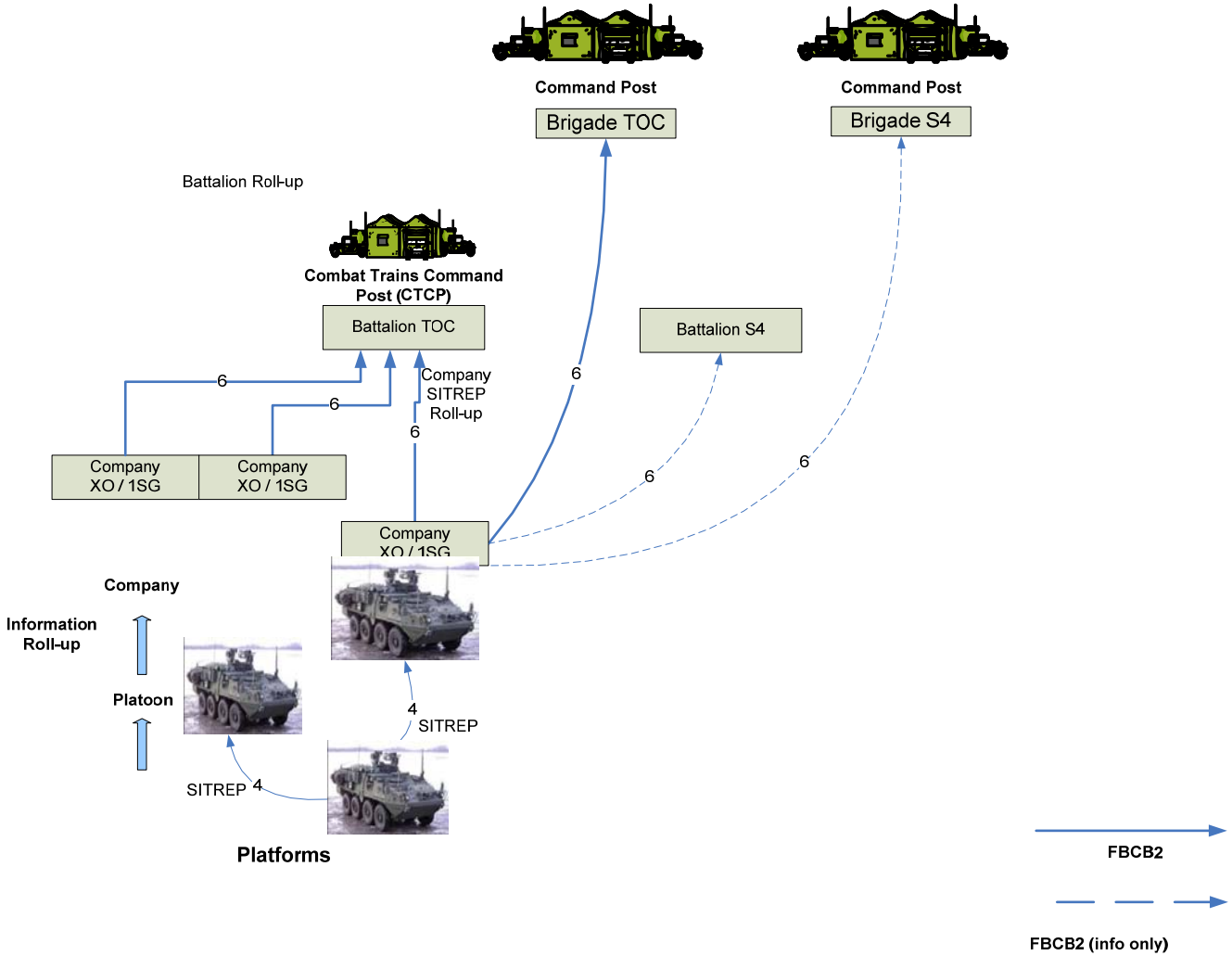
1. Status/color pairing is Go/Green, No Go/Red, Degraded/Yellow and and No Statement/White. No Statement/White is default representation to the operator when no statement has been provided by the system or the system declares "no statement" indicating an assessment is not yet complete.
2. FBCB2 SITREP reporting frequency is configurable with a default setting of 6 hours. Default is set to balance unit commander visibility and tactical network bandwidth impacts. FBCB2 provides the vehicle commander with a more frequent assessment of their own platform.

Preconditions:
There are no known preconditions for this scenario.

The complete flow for this scenario is shown in Figure 15 for items above the platform and Figure 16 for items at the platform level.

Step	Action	AILA Activity
1	FBCB2 requests status information every 30 minutes from the platform.	OA1.2.1.1 Send Fuel Status OA1.2.1.2 Send Ammo Status OA1.2.1.3 Send Maint. Status OA1.2.1.4 Send Crew Status
2	The platform provides: • Fuel Capacity • Fuel Quantity on Hand • LRU Status (Go/No Go/Degraded/No Statement) • Subsystem Status (Go/No Go/ Degraded/No Statement) • Platform Status (Go/No Go/ Degraded/No Statement)	OA1.2.1.1 Send Fuel Status OA1.2.1.2 Send Ammo Status OA1.2.1.3 Send Maint. Status OA1.2.1.4 Send Crew Status
3	When the 6 hour timer has expired, FBCB2 uses the latest data from the platform, and commander entered data and autopopulates the situation report message.	C2 Activity
4	The platform FBCB2 transmits the SITREP message to its distribution list.	C2 Activity
5	Receiving FBCB2 puts the SITREP message into a background queue for review. The officer can review a summary of the status of the platforms by category: • Fuel On Hand • Equipment The summary page shows the officer the number of units reporting each color to him/her. It also allows the officer to view the status of each platform that sent a SITREP message, i.e., drill down.	C2 Activity
6	The officer reviews the summary status and is allowed to change the status if conditions warrant. The officer transmits the summary of the company's SITREP message to its distribution network.	C2 Activity
7	Receiving FBCB2 puts the summary of the company's SITREP message into a background queue for review. The officer can review a summary of the status of the platforms by category: • Fuel On Hand • Equipment The summary page shows the officer the number of units reporting each color to him/her. It also allows the officer to view the summary of each company that sent a summary SITREP message.	C2 Activity

Situation Report



SITREP vmf
K05.14

Figure 15 Situation Report (above platform)

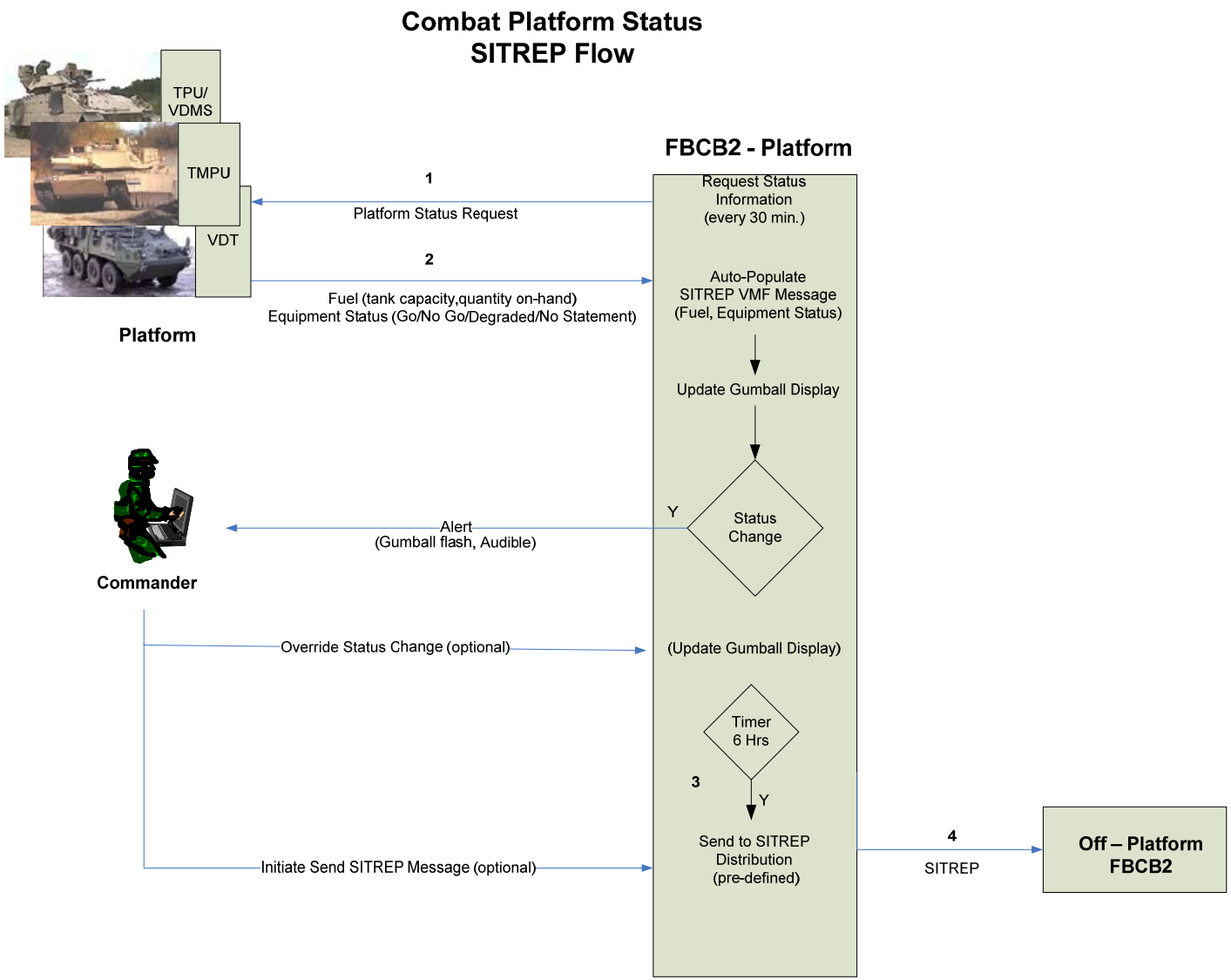


Figure 16 Situation Report (at platform)

5.2 Field Maintenance – Critical Repair and Parts Replenishment

The scenarios that follow address the reporting and repair of critical platform faults in both HBCT and SBCT for Increment 1. The repair scenarios for non-critical faults will be addressed in subsequent implementations.

5.2.1 Request Maintenance Support

5.2.1.1 Heavy Brigade Combat Team (HBCT) Call For Support

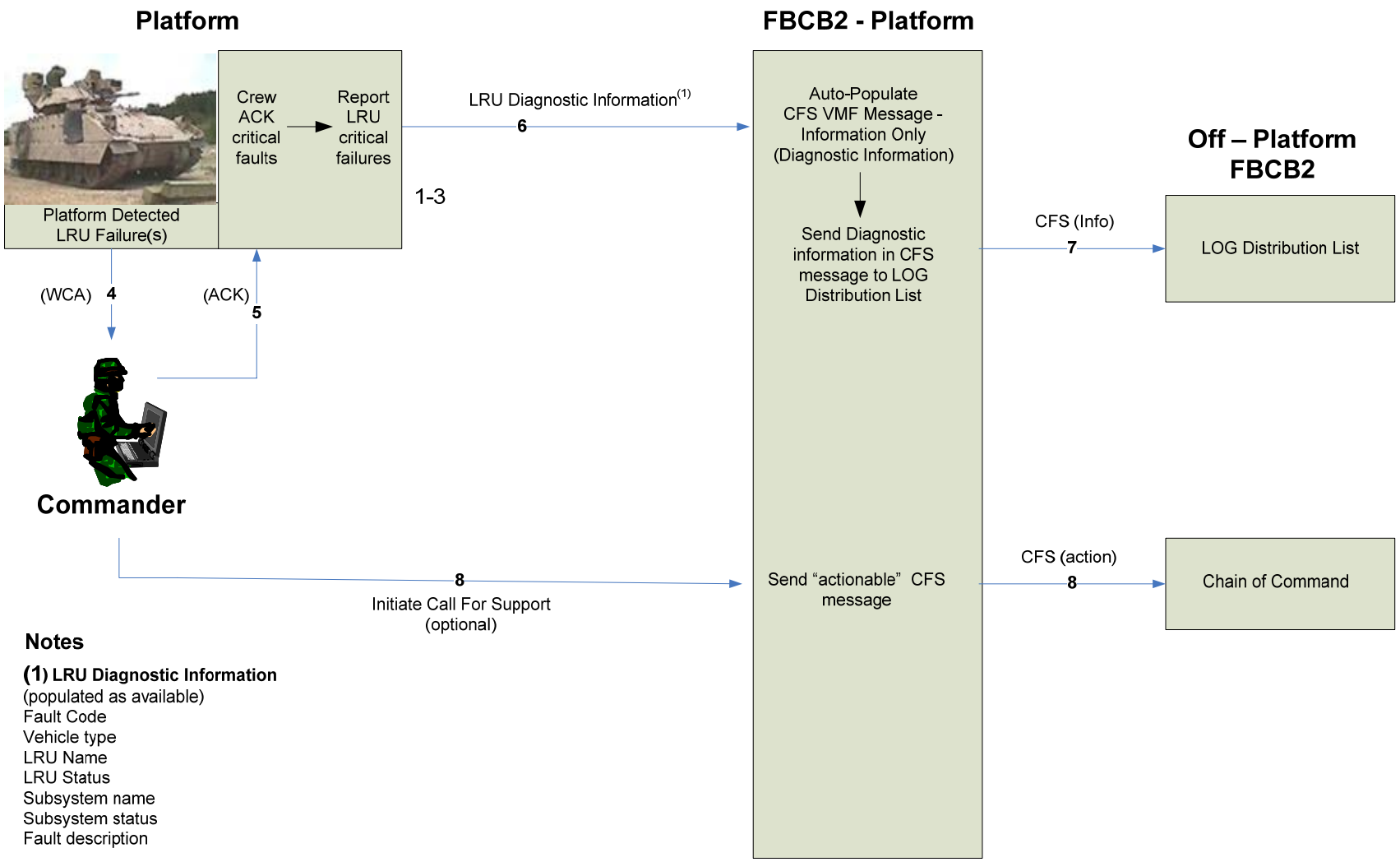
Purpose
This scenario describes the logic flow beginning with a critical platform fault and ending with platform repair by the Field Maintenance Team (FMT).

Preconditions
The log distribution list in the FBCB2 has been set up (unit can add recipients to list based on SOP). The FMT has the part on hand to perform the repair.

The complete flow for this scenario is shown in Figure 19. The platform operations are shown in Figure 17 and Figure 18 for Bradley and Abrams respectively.

Step	Action	AILA Activity
1	Platform diagnostics detects a critical fault.	OA1.2.2 Detect Failure or Shortage
2a	(Abrams) The fault effect is translated into a repair manual reference.	OA1.2.2 Detect Failure or Shortage
2b	(Bradley) The fault effect is rolled up to sub-system status.	OA1.2.2 Detect Failure or Shortage
3	Fault is logged.	OA1.2.2 Detect Failure or Shortage
4a	(Abrams) Platform alerts platform Commander (CDR) of the repair manual reference.	OA1.2.2 Detect Failure or Shortage
4b	(Bradley) Platform alerts platform CDR of the failed sub-system.	OA1.2.2 Detect Failure or Shortage
5	Platform CDR acknowledges the alert.	OA1.2.2 Detect Failure or Shortage
6a	(Abrams) A message is sent to the FBCB2 containing the repair manual reference.	OA1.2.2 Detect Failure or Shortage
6b	(Bradley) A message is sent to the FBCB2 containing the failed sub-system.	OA1.2.2 Detect Failure or Shortage
7	A Call For Support (CFS) maint-log message is automatically populated with fault information and sent to the addressees on the FBCB2 log distribution list (Forward Maintenance Team (FMT) and Maintenance Control Section (MCS)).	OA1.2.2.2 Generate Logistics Support Notification
8	Platform CDR determines that the acknowledged fault is mission critical, and manually populates and sends a CFS maint-C2 message to Platoon Sergeant (SGT).	OA1.2.2.1 Generate C2 notification/alert
9	Platoon SGT receives the CFS maint-C2, reads it, and determines it is Platoon mission critical, and forwards it to Company First Sergeant (1SG).	C2 activity

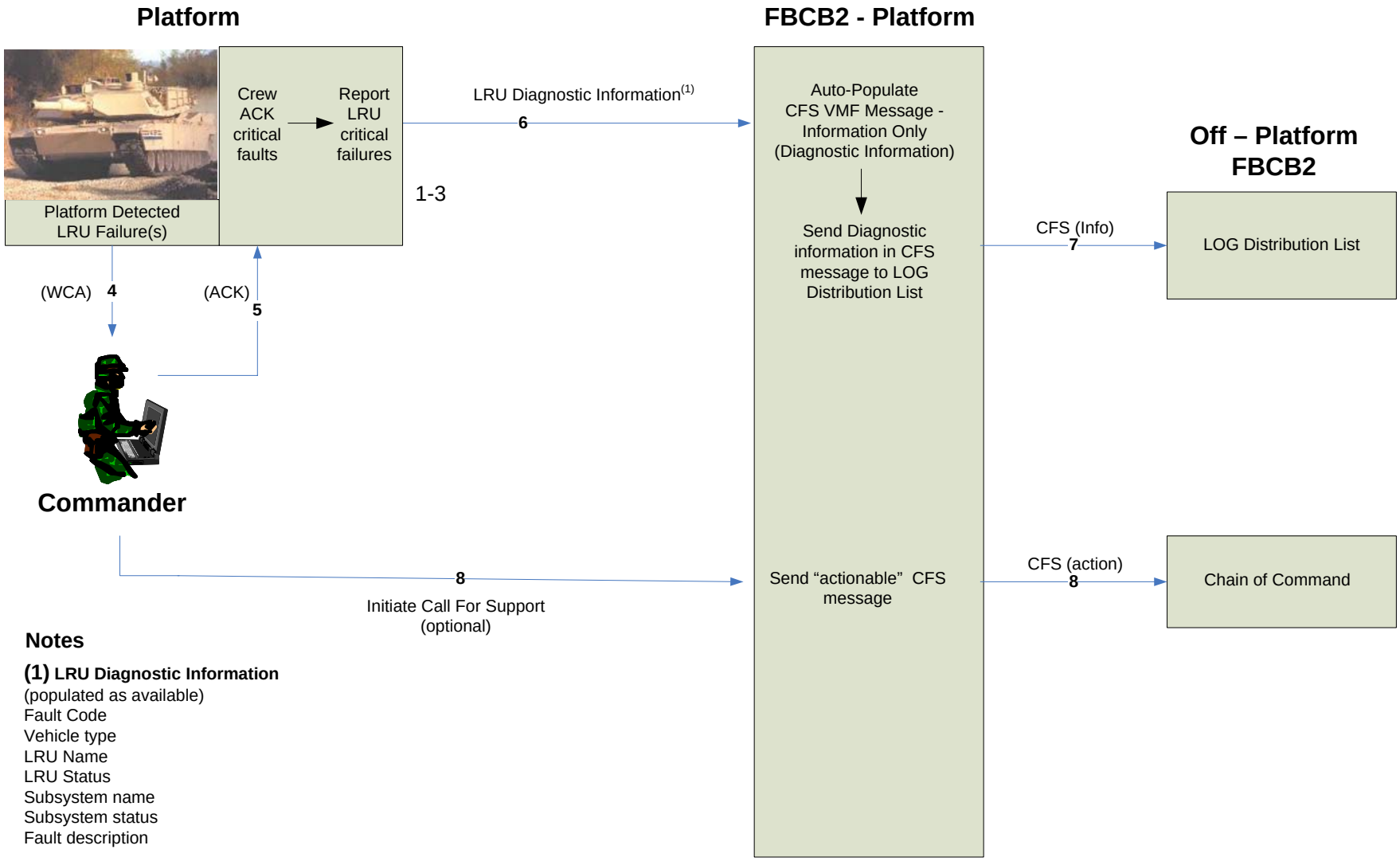
Step	Action	AILA Activity
10	Company 1SG receives CFS maint-C2, reads it, determines that it is Company mission critical, and forwards it to the FMT. Info copies are sent to Company CDR and Combat Battalion (BN) Logistics Officer (S4).	C2 activity
11	On receiving CFS maint-C2, FMT opens a Logistics Task Order (LTO), in accordance with the priorities established by the BNS4 or his designated representative, and sends it to the Maintenance Team (MT). Info copies are sent to the BN S4 and the Maintenance Control Section (MCS).	C2 activity
12	MT sends a Logistics Task Order Synchronization (LTS) to platform for task synchronization. An info copy is sent to FMT and Company 1SG.	C2 activity
13	The MT opens a work order in SAMS-E.	OA1.1.3.1 Open Work Order
14	The MT verifies that parts, personnel, tools, facility, and time are available for repair.	OA1.1.3.5 Identify Resources
15	FMT, MCS, and FMC send Logistics File data to the Support Operations Officer (SPO).	OA1.1.3.8 Generate Work Order Reports
16	Support Operations Officer (SPO) sends a Material Readiness Report (026) to the Maintenance Control Section (MCS) and the FMC.	OA1.1.3.8 Generate Work Order Reports
17	MT repairs the platform.	OA1.1.2.4 Correct Equipment Fault
18	MT closes the work order.	OA1.1.3.3 Close Work Order
19	MT sends out Log Task Status to FMT (party that opened the LTO). FMT closes out LTO. Info copies of Log Task Status go to all addresses of CFS Maint-C2 and LTO.	OA1.1.3 Manage Work Order



Notes

(1) LRU Diagnostic Information
(populated as available)
Fault Code
Vehicle type
LRU Name
LRU Status
Subsystem name
Subsystem status
Fault description

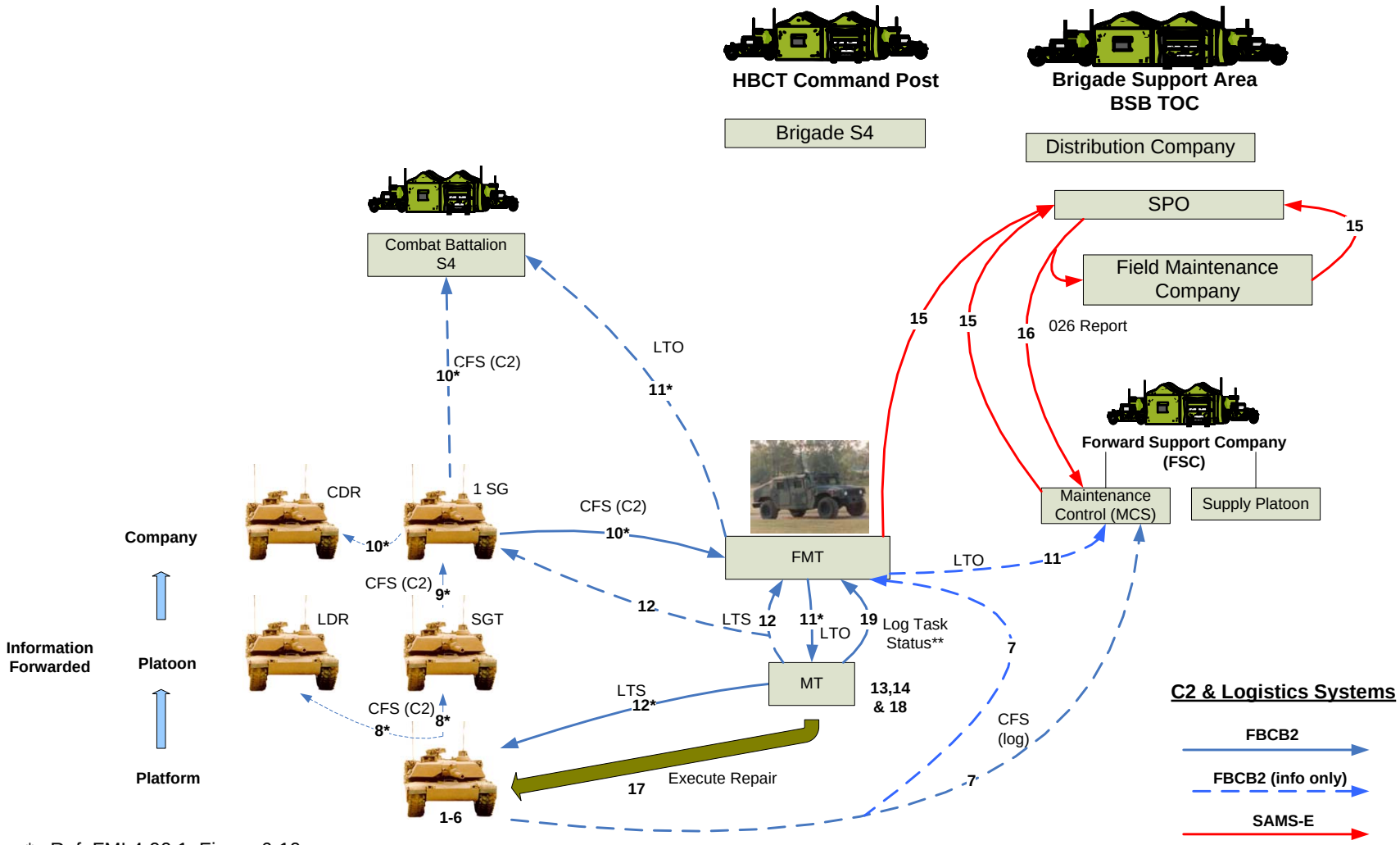
Figure 17 Bradley Call For Support Platform Operations



Notes

(1) LRU Diagnostic Information
(populated as available)
Fault Code
Vehicle type
LRU Name
LRU Status
Subsystem name
Subsystem status
Fault description

Figure 18 Abrams Call For Support Platform Operations



* Ref: FMI 4-90.1, Figure 6-10
** For clarity, info copies not shown

Figure 19 HBCT Call For Support (maintenance, without Class IX)

5.2.1.2 Stryker Brigade Combat Team (SBCT) Call For Support (CFS)

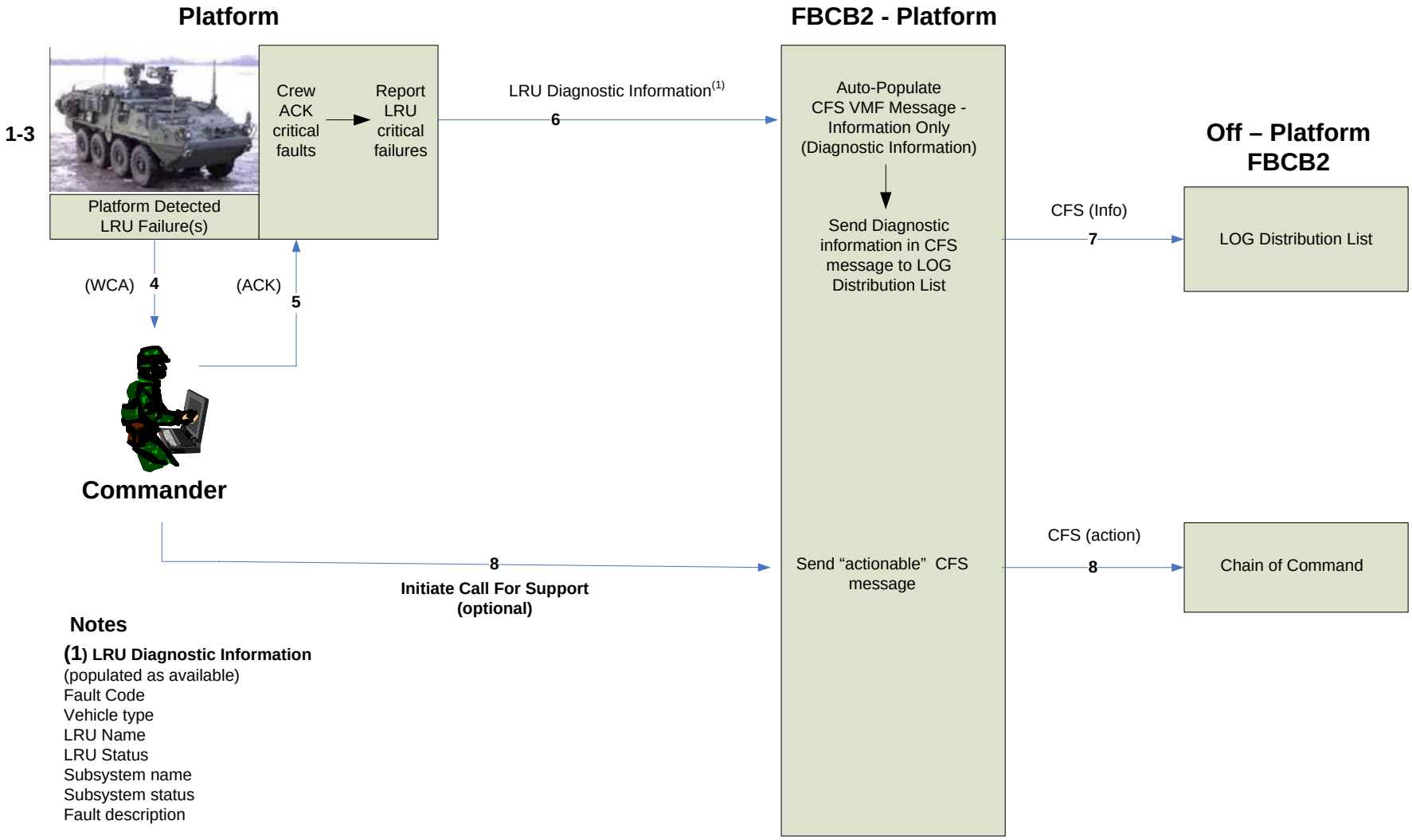
Purpose
This scenario describes the logic flow beginning with a critical platform fault and ending with platform repair by the Combat Repair Team (CRT).

Preconditions
The log distribution list in the FBCB2 has been set up. CRT has the part on hand to perform the repair.

The complete flow for this scenario is shown in Figure 21. Platform operations are shown in Figure 20.

Step	Action	AILA Activity
1	Platform detects a critical fault.	OA1.2.2 Detect Failure or Shortage
2	The fault effect is rolled up to sub-system status.	OA1.2.2 Detect Failure or Shortage
3	Fault is logged.	OA1.2.2 Detect Failure or Shortage
4	Platform alerts Commander (CDR) of the fault.	OA1.2.2 Detect Failure or Shortage
5	CDR acknowledges the alert.	OA1.2.2 Detect Failure or Shortage
6	A message is sent to the FBCB2 containing the fault code, associated sub-system status, and fault description.	OA1.2.2 Detect Failure or Shortage
7	A Call For Support (CFS) maint-log is automatically populated with fault information and sent to the addressees on the FBCB2 log distribution list (Combat Repair Team (CRT) and Forward Maintenance Company (FMC)).	OA1.2.2.2 Generate Logistics Support Notification
8	Platform CDR determines that the acknowledged fault is mission critical and manually populates and sends a CFS maint-C2 message to Platoon SGT. An info copy is sent to the Platoon Leader (PL) and CRT.	OA1.2.2.1 Generate C2 notification/alert
9	Platoon SGT receives the CFS maint-C2, reads it, and determines it is Platoon mission critical, and forwards it to Company Executive Officer (XO).	C2 activity
10	Company XO receives CFS maint-C2, reads it, determines that it is Company mission critical, and forwards it to CRT. Info copies are sent to Company CDR and Combat Train Command Post (CTCP).	C2 activity
11	On receiving CFS maint-C2, CTCP opens a Logistics Task Order (LTO) and sends to CRT. An info copy is sent to FMC.	C2 activity
12	CRT sends a Logistics Task Order Synchronization (LTS) to the platform for task synchronization. An info copy is sent to the CTCP.	C2 activity
13	The MT opens a work order in SAMS-E.	OA1.1.3.1 Open Work Order
14	The MT verifies that parts, personnel, tools, facility, and time are available for repair.	OA1.1.3.5 Identify Resources
15	CRT and FMC send Logistics File data to the SPO.	OA1.1.3.8 Generate Work Order Reports

Step	Action	AILA Activity
16	Support Operations Officer (SPO) sends a 026 report to the CRT and the FMC.	OA1.1.3.8 Generate Work Order Reports
17	CRT takes part out and repairs platform (part is on hand)	OA1.1.2.4 Correct Equipment Fault
18	CRT closes the work order.	OA1.1.3.3 Close Work Order
19	CRT sends out Log Task Status to CTCP (party that opened the LTO). CTCP closes out LTO. Info copies of Log Task Status go to all addresses of CFS Maint-C2 and LTO.	OA1.1.3 Manage Work Order



Notes

(1) LRU Diagnostic Information
(populated as available)
Fault Code
Vehicle type
LRU Name
LRU Status
Subsystem name
Subsystem status
Fault description

Figure 20 Stryker Call For Support Platform Operations

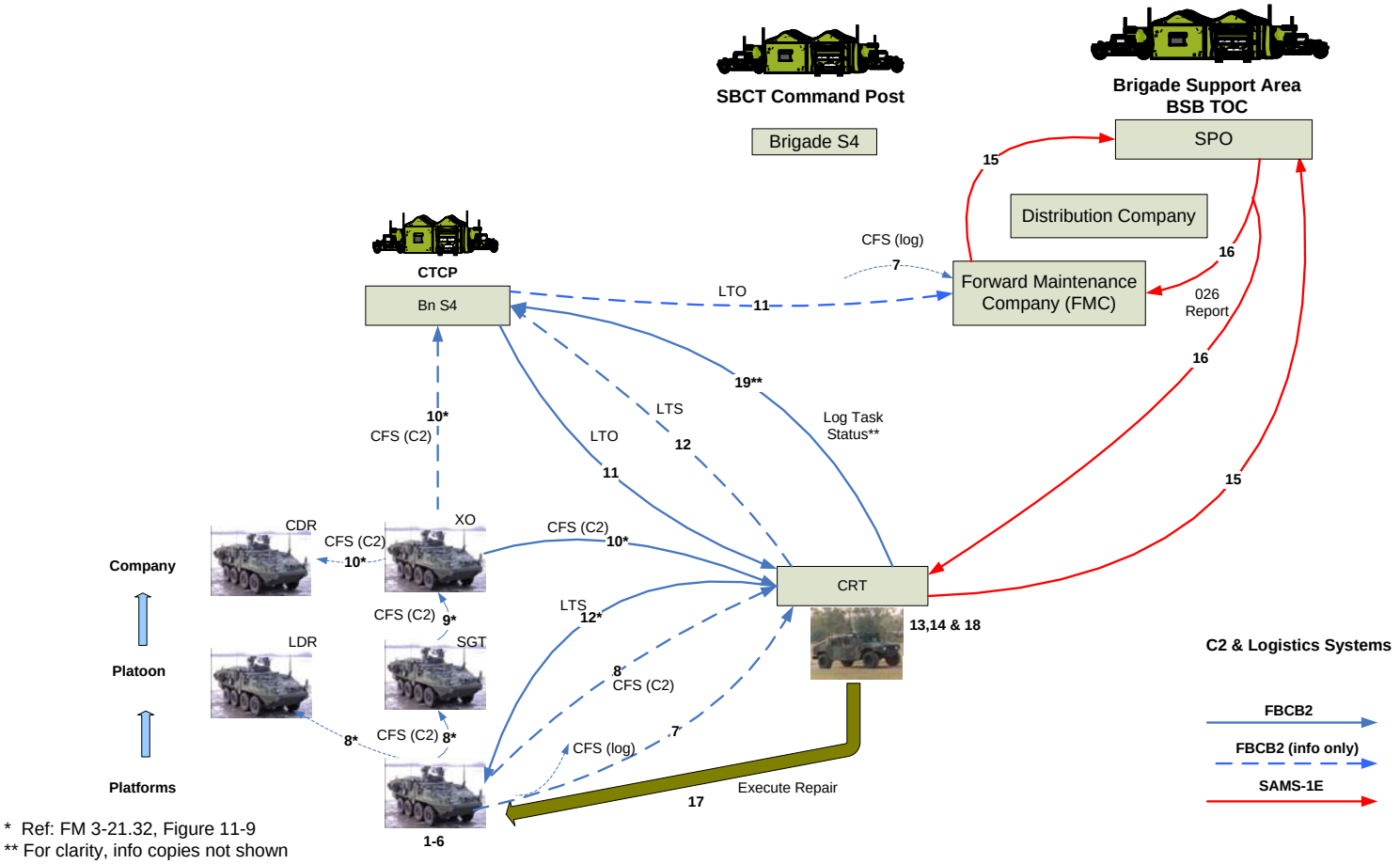


Figure 21 SBCT Call For Support (maintenance, without Class IX)

5.2.2 Part Replenishment

5.2.2.1 Heavy Brigade Combat Team (HBCT) Repair Part Process

Purpose
This scenario describes the logic flow beginning with the demand for a repair part and ending with the required part delivered to the maintenance team (MT).

Preconditions
The MT has a need for a part to repair a platform.

The complete flow for this scenario is shown in Figure 22. Note: Information flows identified as periodic (or daily) are provided for context, but are not shown in the step number sequence since they are not directly part of the event flow.

Step	Action	AILA Activity
1	Field Maintenance Team (FMT) orders part from the Distribution Company using SAMS-E.	OA1.13.1.1 Create Supply Request OA1.13.1.2 Determine Supply Availability
2	Distribution Company determines that the required part is not on hand, and orders part through SARSS-1 to the wholesale system using the Standard Army Retail Supply System (SARSS) -2AC.	OA1.13.1.1 Create Supply Request OA1.13.1.2 Determine Supply Availability OA1.13.1.4 Approve Supply Request
3	The part is delivered to the Distribution Company.	OA1.13.2 Fulfill Supply Request
4	The Distribution Company delivers the part to the Forward Support Company (FSC).	OA1.13.3 Issue Supplies
5	The FSC delivers the part to the FMT.	OA1.13.3 Issue Supplies

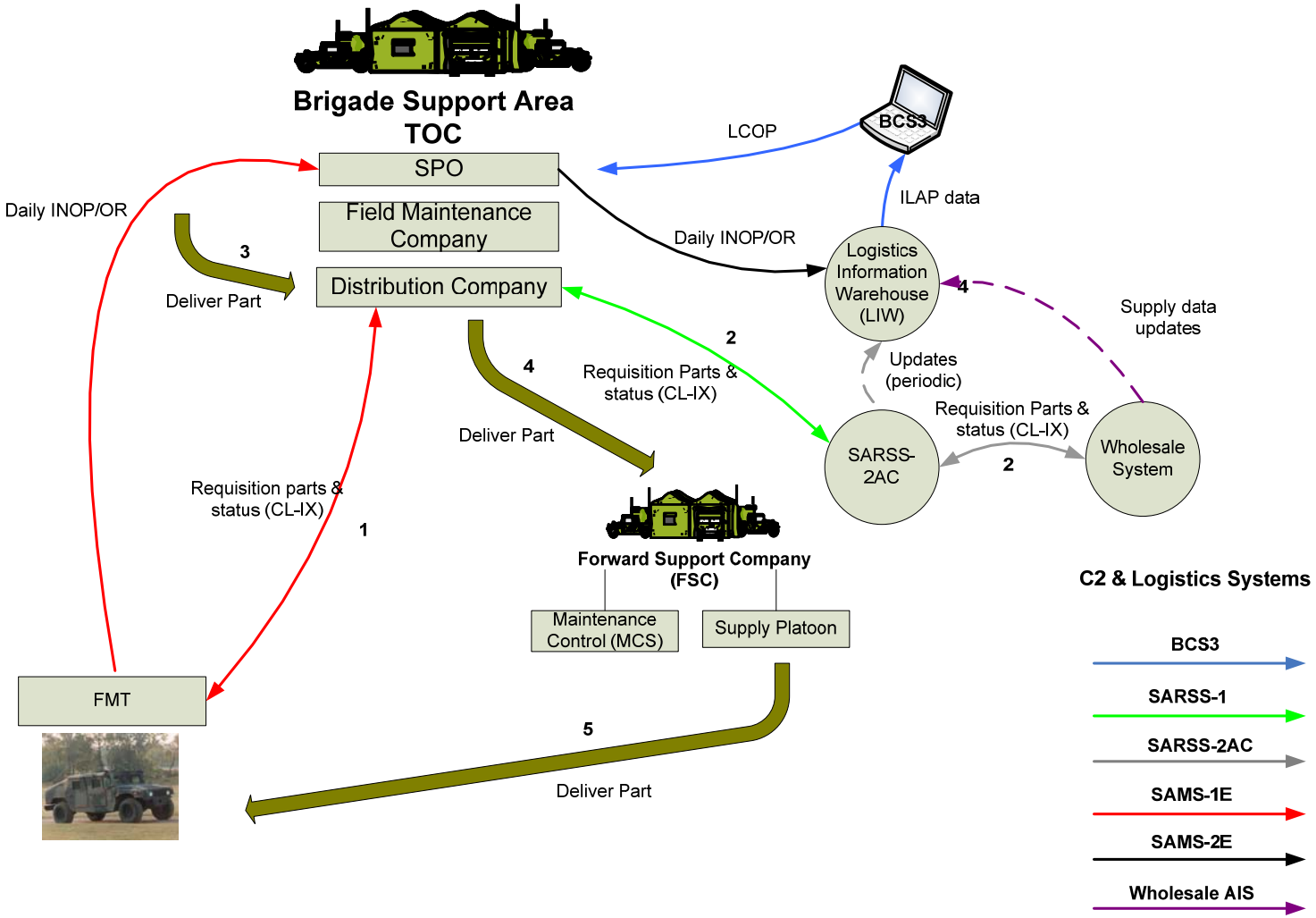


Figure 22 HBCT Part Replenishment

5.2.2.2 Stryker Brigade Combat Team (SBCT) Repair Part Process

Purpose
This scenario describes the logic flow beginning with the demand for a repair part and ending with the required part delivered to the Combat Repair Team (CRT).

Preconditions
The CRT has a need for a part to repair a platform.

The complete flow for this scenario is shown in Figure 23. Note: Information flows identified as periodic (or daily) are provided for context, but are not shown in the step number sequence since they are not directly part of the event flow.

Step	Action	AILA Activity
1	CRT orders part from the Distribution Company using Standard Army Maintenance System (SAMS)-1E.	OA1.13.1.1 Create Supply Request OA1.13.1.2 Determine Supply Availability
2	Distribution Company determines that the required part is not on hand, and orders part through SARSS-1 to the Wholesale System using the SARSS-2AC.	OA1.13.1.1 Create Supply Request OA1.13.1.2 Determine Supply Availability OA1.13.1.4 Approve Supply Request
3	The part is delivered to the Distribution Company. (when the repair part is received by the Distribution Company it is logged in and then issued to the CRT)	OA1.13.2 Fulfill Supply Request
4	The Distribution Company delivers the part to the CRT.	OA1.13.3 Issue Supplies

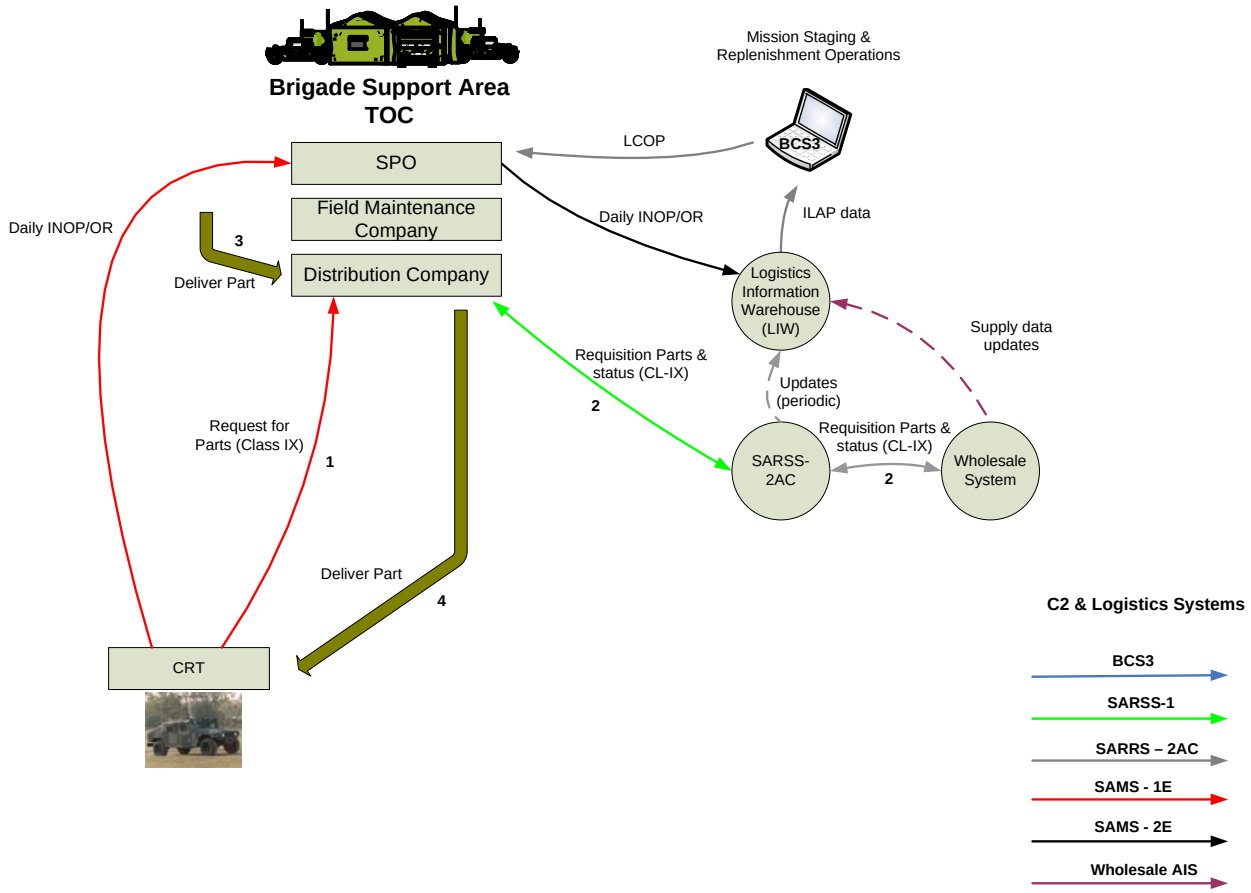


Figure 23 SBCT Part Replenishment

5.3 General Supply Operations – Class III (B) Scenario

These scenarios show the applicable steps associated with the periodic refueling process.

5.3.1 Report Fuel Status

5.3.1.1 Stryker Brigade Combat Team (SBCT)

Purpose
This scenario provides the logic and decision flow to refuel the Stryker vehicle on a routine basis.

Preconditions
The Logisticians' address list in the FBCB2 has been created.

The complete flow for this scenario is shown in Figure 24. The generation of LOGSTAT message by the FBCB2 is shown in Figure 25.

Step	Action	AILA Activity
1	FBCB2 requests status information every 30 minutes from the platform.	OA1.2.1.1 Send Fuel Status
2	The platform responds with the fuel capacity and fuel quantity on hand to the FBCB2.	OA1.2.1.1 Send Fuel Status
3	When the 6 hour timer has expired, FBCB2 uses the latest data from the platform, and the commander input and auto-populates the logistics situation report message.	OA1.2.1.1 Send Fuel Status
4	The platform FBCB2 sends LOGSTAT message to the platoon leader via FBCB2.	C2 Activity
5	Platoon leader reviews, compiles an aggregate LOGSTAT and forwards the aggregate LOGSTAT message to the company Executive Officer (XO)/ First Sergeant (1SG) via FBCB2.	C2 Activity
6	The company XO/1SG compiles an aggregate LOGSTAT for the company's status and supply requirements and forwards it to the Combat Battalion (BN) S4 using the FBCB2.	C2 Activity
7	The BN S4 reviews the reports and forwards the individual company reports to the SBCT rear Command Post (CP) via FBCB2.	C2 Activity
8	The SBCT - CP consolidates the Logistics Reports via spreadsheet and transfers the completed information to the SPO and C2 System Brigade and Above. The BSB reports the fuel on hand status to C2 System Brigade and Above.	
9	SBCT –CP issues an Operation Order (OPORD) or Fragmentary Order (FRAGO), via FBCB2, to the BSB for resupply. SPO coordinates the resupply time and location. Distribution Company supplies the bulk fuel, which may be delivered to a company, battalion, or area-based Logistics Re-supply Point (LRP).	
10	The SBCT CP advises the Combat Battalion S4, via FBCB2, of the exact quantities of supplies, LRP locations, and timing of logistics packages (LOGPACs).	C2 Activity

Step	Action	AILA Activity
11	Brigade S4 and BSB Support Operations Officer (SPO) forecast fuel usage and enter the information into BCS3 to depict projected fuel status and provide the information to the sustainment brigade.	OA1.13.1.1.2 Request CLASS III (Bulk/Retail/Aerial)
12	At the appointed time, the distribution company meets a representative of the platoon at the LRP. The distribution company is escorted to the platforms for refueling.	

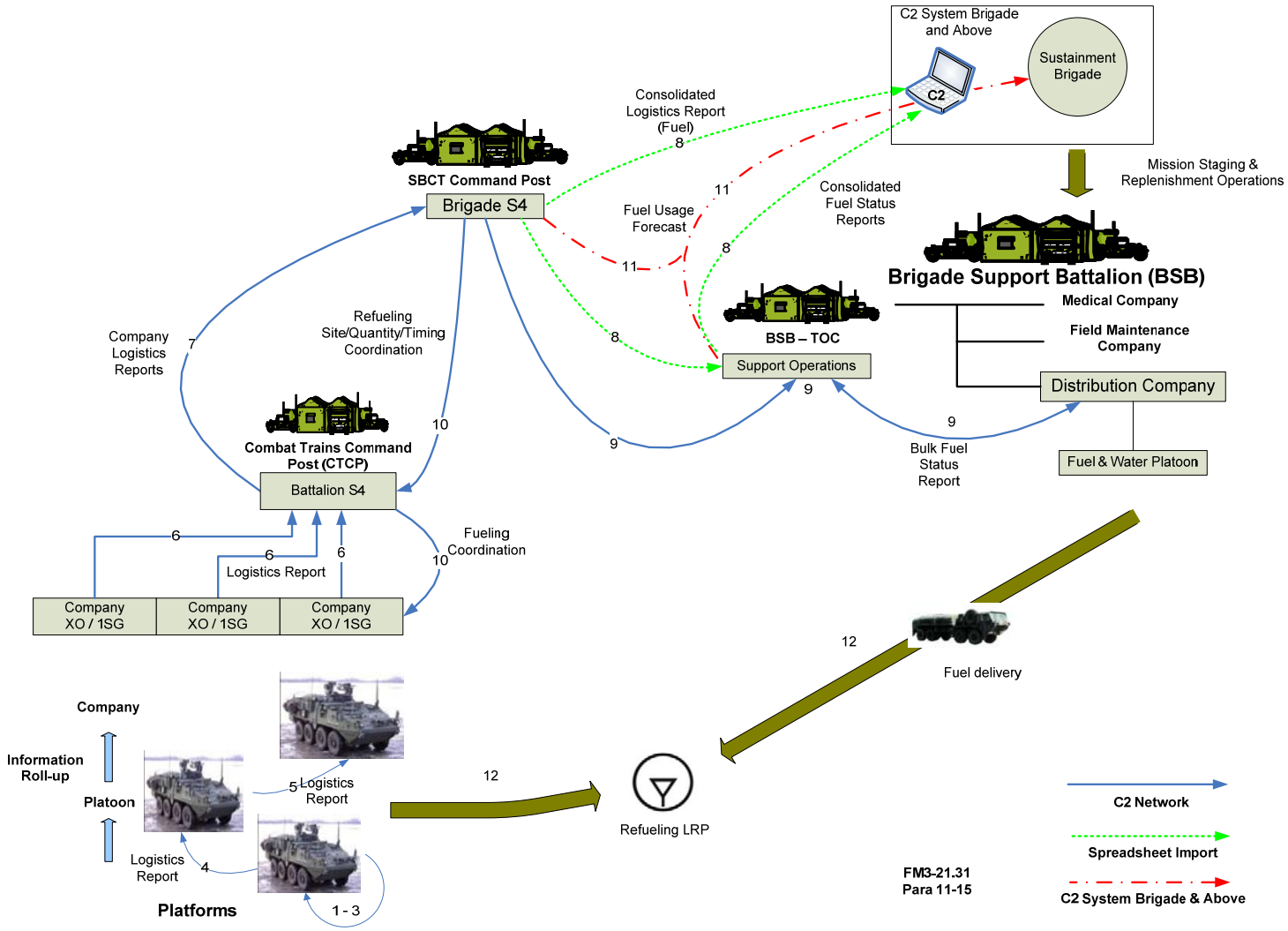


Figure 24 Stryker Class III (B) Supply

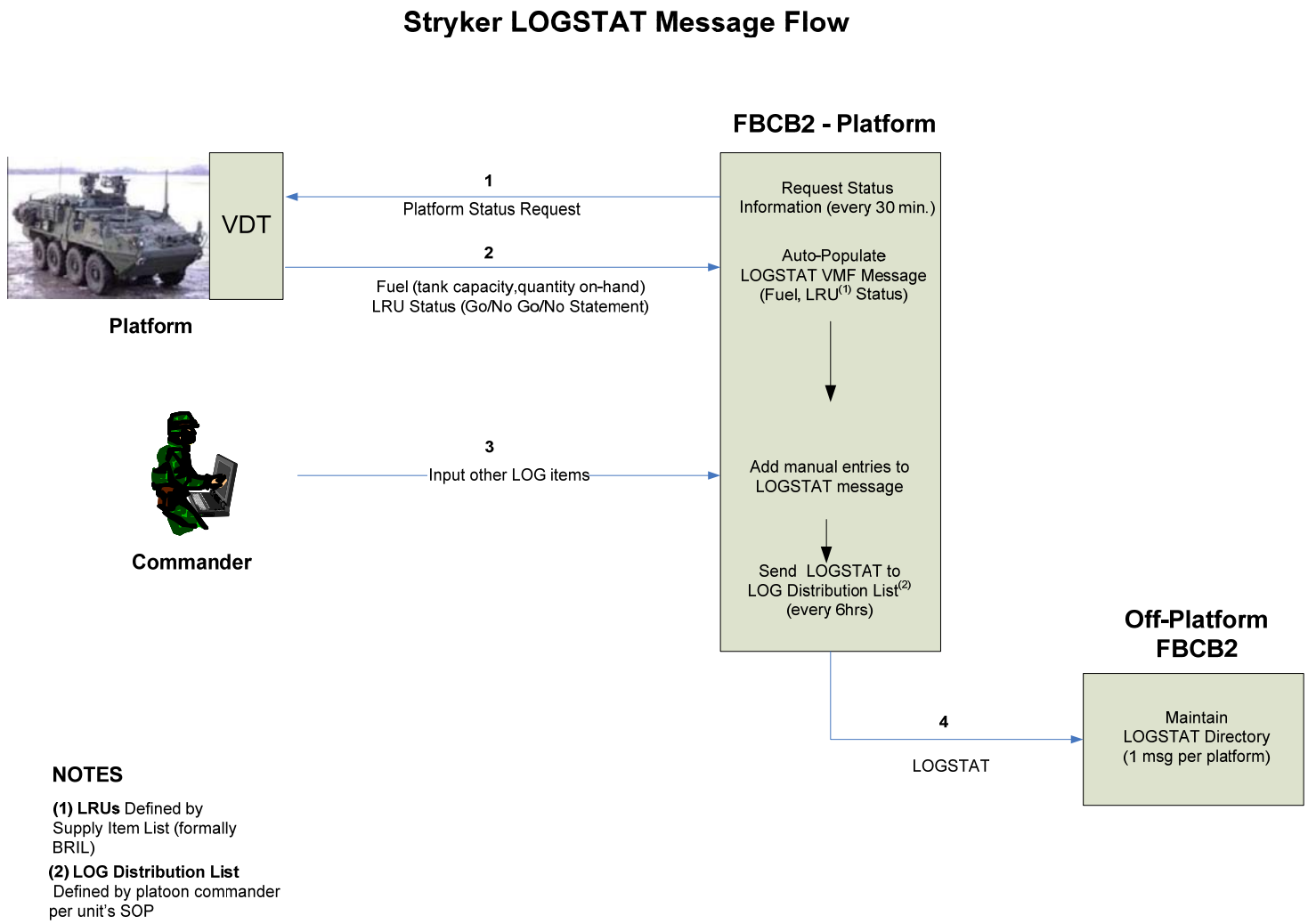


Figure 25 SBCT Class III (B) Supply at Platform

5.3.1.2 Heavy Brigade Combat Team (HBCT)

Purpose
The Abrams is on a mission and periodically sends the logistics situation report. The fuel needs are anticipated and a fuel delivery is made.

Preconditions
A Logisticians' address list has been created in the FBCB2.

The complete flow for this scenario is shown in Figure 26. The generation of LOGSTAT message by the FBCB2 is shown in Figure 27.

Step	Action	AILA Activity
1	FBCB2 requests status information every 30 minutes from the platform.	OA1.2.1.1 Send Fuel Status
2	The platform responds with the fuel capacity and fuel quantity on hand.	OA1.2.1.1 Send Fuel Status
3	FBCB2 uses the platform data to auto populate the logistics situation report message.	OA1.2.1.1 Send Fuel Status
4	The platforms report fuel quantity using the LOGSTAT message. The fuel quantity of each platform in the platoon is consolidated by the platoon leader.	C2 Activity
5	The platoon leader consolidates the LOGSTAT messages and forwards them to the company first sergeant (1SG).	C2 Activity
6	The company 1SG submits fuel status report via FBCB2 to the Battalion (BN) S4 with an information copy to the Forward Support Company (FSC) Command Post (CP).	C2 Activity
7	BN S4 consolidates battalion fuel status report and submits by company rollup via FBCB2 to the brigade S4, with an info copy to the FSC CP.	C2 Activity
8	Brigade S4 consolidates the battalion reports and submits the consolidated report to the BSB Operations via FBCB2.	C2 Activity
9	FSC and Brigade Support Battalion (BSB) Distribution Comppany submit their bulk fuel status reports to the BSB Support Operations Center via FBCB2.	C2 Activity
10	BSB Support Operations Officer (SPO) consolidates the LOGSTATs via spreadsheet and transfers the completed information into the Battle Command Sustainment Support System (BCS3) making it visible to the sustainment brigade.	OA1.13.1.1.2 Request CLASS III (Bulk/Retail/Aerial)
11	BSB SPO coordinates the location and quantity of fuel to be delivered to the FSC and BSB Distribution Company via FBCB2.	C2 Activity
12	FSC communicates the location and quantity of fuel to be delivered to affected units and the supply platoon.	
13	The brigade S4 and BSB SPO forecast fuel usage and enter the information into BCS3 to depict projected fuel status and provide the information to the sustainment brigade.	
14	At the appointed time, the distribution company meets a representative of the platoon at the Logistics Resupply Point (LRP). The distribution company is escorted to the platforms for refueling.	

HBCT Class III (Bulk) Fuel Operations

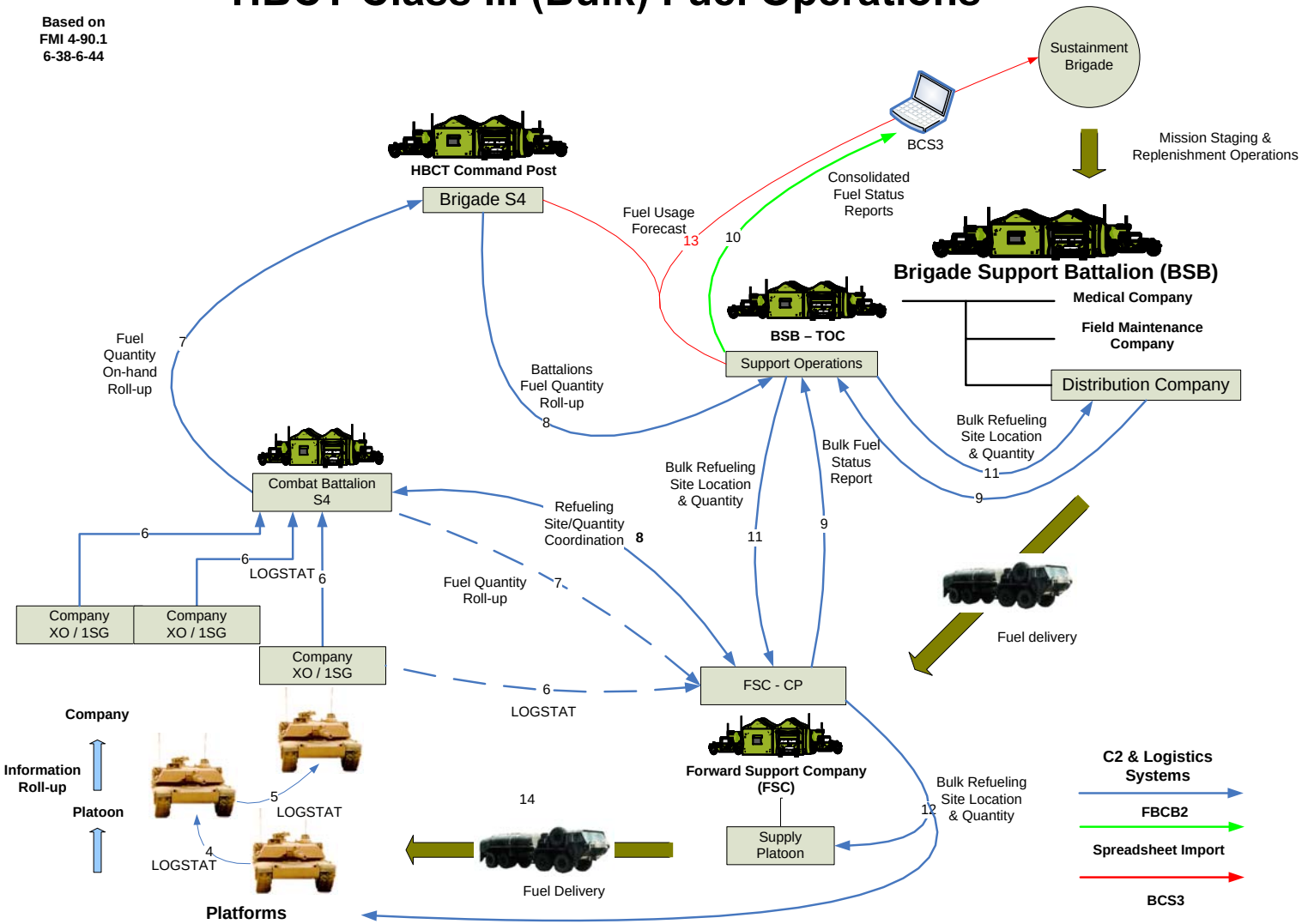


Figure 26 HBCT Class III (B) Supply

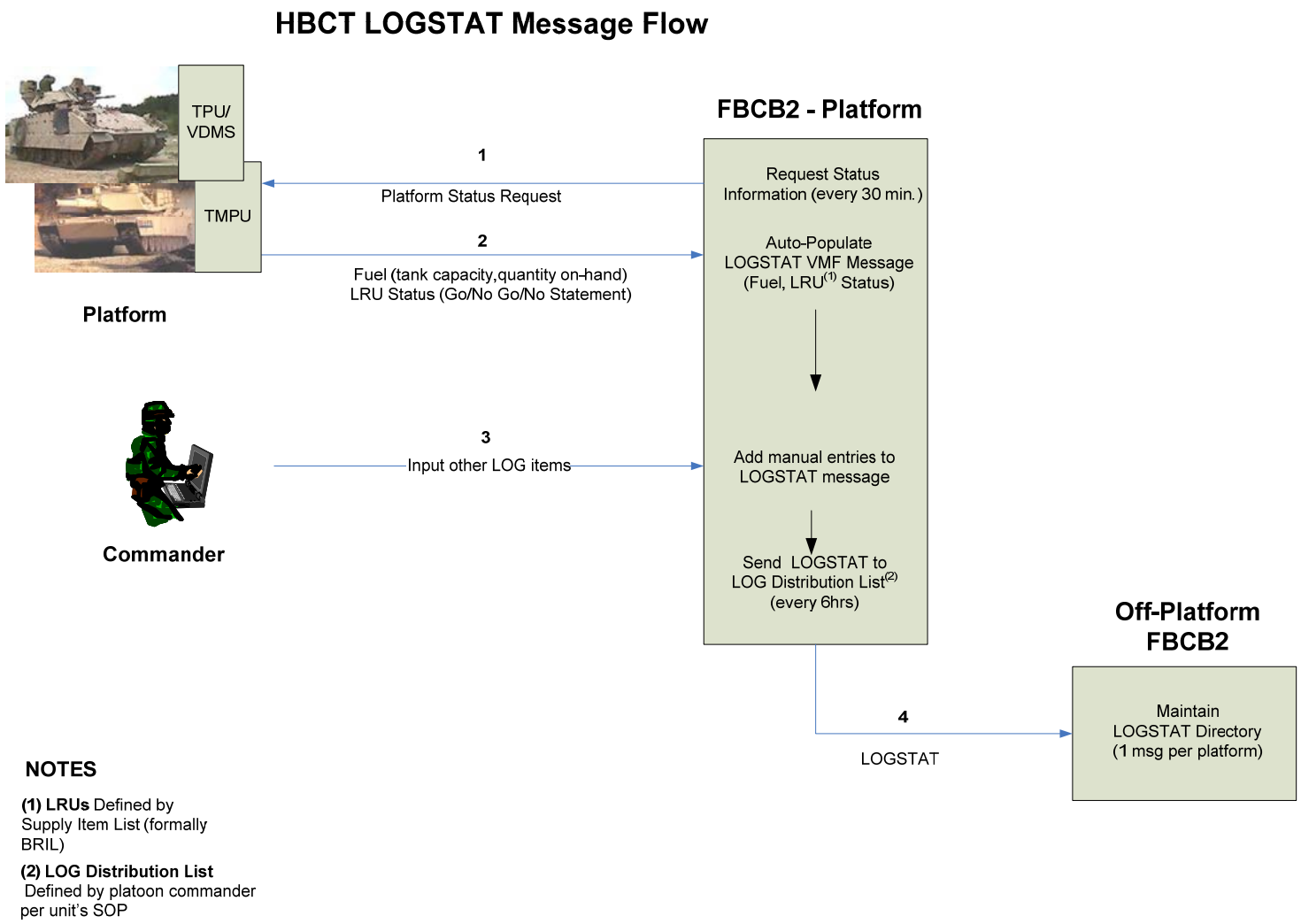


Figure 27 HBCT Class III (B) Supply at Platform

6 Appendix

6.1 Acronym List

1SG	First Sergeant
ABCS	Army Battle Command System
AILA	Army Integrated Logistics Architecture
AO	Area of Operation
BCS3	Battle Command Sustainment Support System
BCT	Brigade Combat Team
BFT	Blue Force Tracking
BDE	Brigade
BN	Battalion
BSA	Brigade Support Area
BSB	Brigade Support Battalion
C2	Command and Control
C3	Command, Control and Communications
CAISI	Combat Service Support Automated Information Systems Interface
CABM	CAISI Bridge Module
CCM	CAISI Client Module
CDMS	Code Division Multiple Access
CDR	Commander
CFS	Call for Support
CLOE	Common Logistics Operating Environment
CNR	Combat Net Radio
CP	Command Post
CRC	Component Repair Companies
CRM	CAISI Repeater Module
CRT	Combat Repair Team
CSS	Combat Service Support
CTCP	Combat Trains Command Post
DS	Direct Support
EPLRS	Enhanced Position Location Reporting System
FBCB2	Force XXI Battle Command Brigade and Below
FIPS	Federal Information Processing Standards
FM	Field Manual
FMC	Field Maintenance Company
FMT	Field Maintenance Team
FRAGO	Fragmentary Order
FSC	Forward Support Company
GCS	Ground Combat Systems
GPS	Global Positioning System
GS	General Support
GUI	Graphical User Interface
HBCT	Heavy Brigade Combat Team
HEMTT	Heavy Expanded Mobility Tactical Truck
HMMWV	High Mobility Multipurpose Wheeled Vehicle
HQDA	Headquarters, Department of the Army

IEEE	Institute of Electrical and Electronics Engineers
JNN	Joint Node Network
LAN	Local Area Network
L-Band	Long Band
LCOP	Logistics Common Operating Picture
LOGPAC	Logistics Package
LRP	Logistics Resupply Point
LRU	Line Replaceable Unit
LTO	Logistics Task Order
LTS	Logistics Task Order Synchronization
MCS	Maintenance Control Section
MSE	Mobile Subscriber Equipment
MT	Maintenance Team
MTS	Movement Tracking System
NCS	Net Control Station
NETCON	Network Control
NIPRNET	Non-Classified Internet Protocol Routed Network
O26	Materials Readiness Report
OCD	Operational Concept Description
OPORD	Operation Order
PL	Platoon Leader
RF	Radio Frequency
RFID	Radio Frequency Identification
S3	Operations and Training Officer
S4	Logistics Officer
SAMS-E	Standard Army Maintenance System – Enhanced
SARSS	Standard Army Retail Supply System
SATCOM	Satellite Communications
SBCT	Stryker Brigade Combat Team
SCPC	Single Carrier Per Channel
SGT	Sergeant
SINCGARS	Single Channel Ground and Airborne Radio System
SMC	Support Maintenance Company
SOP	Standing Operating Procedure
SOS	System of Systems
SPO	Support Operations Officer
SSA	Supply Support Activity
SSR	System Support Representative
STAMIS	Standard Army Management Information System
TDMA	Time Division Multiple Access
TOE	Table of Organization and Equipment
TOC	Tactical Operations Center
TWV	Tactical Wheeled Vehicle
UII	Unique Item Identifier
VSAT	Very Small Aperture Terminal
WLAN	Wireless Local Area Network
WIN-T	Warfighter Information Network- Tactical
XO	Executive Officer

6.2 CLOE Incremental Implementation Roadmap

CLOE enabled capabilities will be implemented incrementally to enable end-to-end logistics and sustainment benefits within time and budget constraints. This section provides a context roadmap of how Increment 1 advances towards the objective and enables subsequent increments. The required system and process enhancements to be included in the CLOE fielding implementations are shown in Figure 28. The capabilities that are planned for Increment 1 and Increment 2 are summarized in Figure 29 and Figure 30 respectively. The capabilities, per Increment, are planning targets and are subject to adjustment by the Product Manager (PM) as part of the development process.

- **Automated Platform Status Reporting Over FBCB2 and MTS**
  - Fuel Status
  - Platform Ammo Inventory
  - Equipment Health
    - System Status
    - Critical Faults
    - Predicted Faults
  - Enhanced Situational Awareness (SA) Displays for Tactical CDR's and Log Staff
- **Electronic Maintenance**
  - Embedded Interactive Electronic Technical Manuals (IETMS) with Digital Preventive Maintenance Checks and Services (PMCS)
  - Faults from Diagnostics System Linked to Troubleshooting Tracks
  - Enhanced Crew Station Displays
  - Automated Configuration Tracking
- **Business Process Automation**
  - Automated Dispatch and Logbook Updates via CAISI
  - Automated Transfer of Fault/Part Info from Platform to SAMS via CAISI
  - Platform Data Flowing to Condition Based Maintenance Plus (CBM+) Data Warehouse

Figure 28 – CLOE Program Planned System and Process Enhancement Objectives

- **Stryker/Abrams/Bradley**
  - Report fuel and equipment status through FBCB2 ICD
  - Report mission-critical faults through FBCB2 ICD (operator in the loop)
  - Digital PMCS (PDA-based)
  - Digital Logbook (PDA-based)
- **TWV**
  - Embedded Diagnostics - Visual Integrated Display System (VIDS) plus Diagnostic Test Manager
  - Report fuel and equipment status through FBCB2
  - Report mission critical faults through FBCB2
  - Embedded IETM with DPMCS (EMS2-based)
  - Embedded Digital Logbook (SAMS-E)
  - Diagnostics System, IETM, Logbook, and DPMCS exchange data
  - PDA for walk-around capability
  - Collect and Store usage Data and Pass to SAMS-E (VIDS)
- **FBCB2**
  - Auto-populate SITREP and Log Report Using Platform data
  - Auto-populate CFS Using Platform Data
  - Combat Power Displays
  - Distribute Log report and CFS to Log Net
- **MTS**
  - Transmit platform status and critical fault reports
  - Display status information and critical fault reports to Control Station Users
  - Publish critical fault reports to SAMS-E
- **SAMS-E**
  - Automated Dispatch
  - Auto-populate Embedded Logbook with fault data from diagnostics system and DPMCS data (TWVs)
  - Synchronize Embedded Logbook and Master Records over CAISI
  - Server functions on SAMS-E hardware to pass usage data to warehouse

Figure 29 - Increment 1 Capabilities

- **Stryker/Abrams/Bradley**
  - Embedded IETM with DPMCS, and Logbook (SAMS-E)
  - Embedded Applications Exchange Data through Publish/Subscribe Interface
  - Report fuel, ammo, and equipment status through Joint Capabilities Relief (JCR)
  - Report mission-critical faults through JCR (operator in the loop)
  - Collect and Store Usage Data and Pass to SAMS-E
  - Configuration tracking of major LRUs
  - PDA for walk-around capability
- **TWV**
  - Configuration tracking of major LRUs
  - Platform interface with JCR for status and fault reporting
- **JCR**
  - Integrated Line of Products for Combat Platforms and TWVs
  - Publish/subscribe interface with platforms
  - Automated status reporting of fuel, ammo, equipment health
  - Automated reporting of quantitative log data to log net
- **SAMS-E**
  - Platform configuration tracking
  - Auto-populate Embedded Logbook with fault data from diagnostics system and DPMCS data (all platforms)
  - Server functions on SAMS-E hardware to pass usage data to warehouse (all platforms)

Figure 30 - Increment 2 Capabilities