

Operation Iraqi Freedom Bandwidth Analysis

by Robert Rolfe

The Joint Center for Operation Analysis and Lessons Learned (JCOA-LL) asked IDA to identify communications bandwidth lessons learned based on the communications architecture used during major combat operations of Operation Iraqi Freedom (OIF). This study takes into account specific systems and capabilities from the edge of the joint integrated network and command infrastructures to the “last tactical mile” (LTM) and deployed user. IDA was asked to perform the following:

- Describe the OIF communications architecture in narrative terms.
- Assess bandwidth for OIF area of regard down to the LTM and global reach-back.
- Assess bandwidth differences among Services in terms of capacity and usage.

JCOA-LL collects, analyzes, and archives relevant lessons learned from the operational level of war in support of regional combatant commanders. In this case, JCOA-LL’s analysis

concerning OIF was for the Secretary of Defense and the Combatant Command. These analyses provide operational documentation from the warfighter that often result in recommendations for change to current plans and policy.

The Process

IDA proved the ideal organization to conduct this analysis. The study required unfettered access to the JCOA-LL database and critical IDA Joint Advanced Warfighting Program (JAWP) facility resources essential to data collections, which were not released outside JCOA-LL’s control. Because of other JAWP activities, IDA already was providing some support across the spectrum of information and resources needed for this study

IDA’s initial analysis focused on the communications architectures and bandwidth capacities at the fixed and stationary sites, starting with the headquarter locations of the Joint Command and Control Centers within the OIF area of regard. With that as the foundation, the analysis followed the information flow through the Service communication infrastructures by focusing on

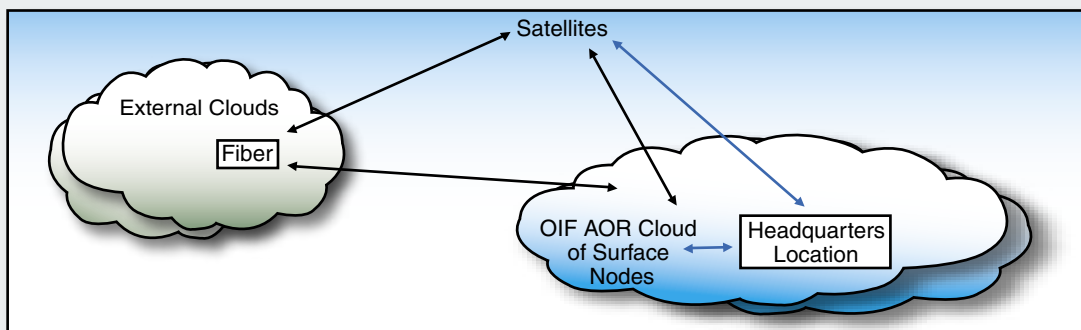


Figure 1. Determining Communications Bandwidth Capacity by Type (Fiber & Satellite), connections to Operation Iraqi Freedom area of responsibility (AOR) Cloud of Surface Nodes, and Headquarters. The figure above illustrates the bandwidth elements of the OIF communications network. The total bandwidth is the sum of all of the long distance communications links connected into a network. The network of interest is within the AOR of the U.S. Central Command and external (e.g., CONUS). We illustrate both terrestrial fiber connections external to and within the AOR and links through satellites. The slender black lines are possible connections, and the blue line is an example of connections to a headquarters. A cloud is a collection of network nodes that may provide connectivity within the set of cloud nodes and connectivity to other external clouds and nodes.

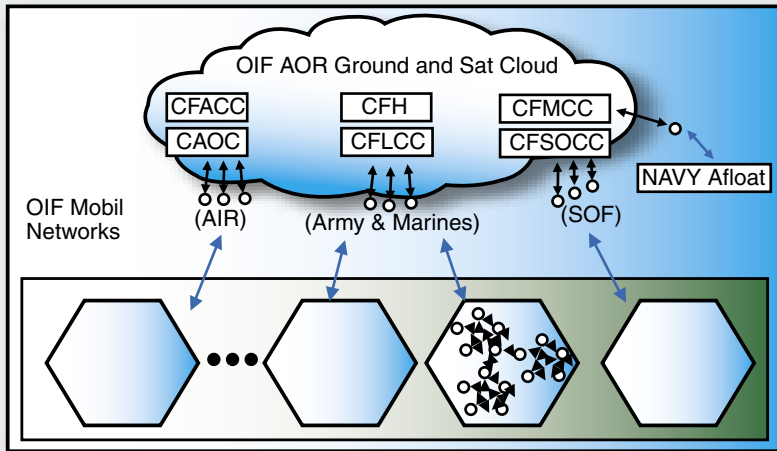


Figure 2. Analyzing Communications Bandwidth Capacities to the Mobil Networks by Command Centers and Services. The figure above illustrates the quasi-stationary nodal command centers in the AOR and how they connect to joint Service mobile networks or nodes. The blue lines represent many connections.

specific capabilities of individual terminals and networks (Figures 1 through 4).

The study team located and collected sparsely available information, reverse-engineered communications architectures to a reasonably high-fidelity, and characterized in measurable terms the LTM communications capabilities and limitations. JCOA-LL has used IDA's study to create input for the concept refinement phase of for future network acquisition through JCIDS process, including to the JROC to support new requirements, and the Network Centric Warfare Functional Capabilities Board. An annotated briefing of IDA's analyses has been presented as "predecisional information" across DoD organizations responsible for future network

acquisition and operations. The final IDA report was released to the sponsor in the 2nd quarter of FY2006, and continuing efforts are addressing current OIF Army and theatre coalition networks and Tsunami Relief Operations networks. Additional effort to support U.S. Central Command strategic architecture activities is currently being defined, and IDA is briefing organizations and agencies across DoD.

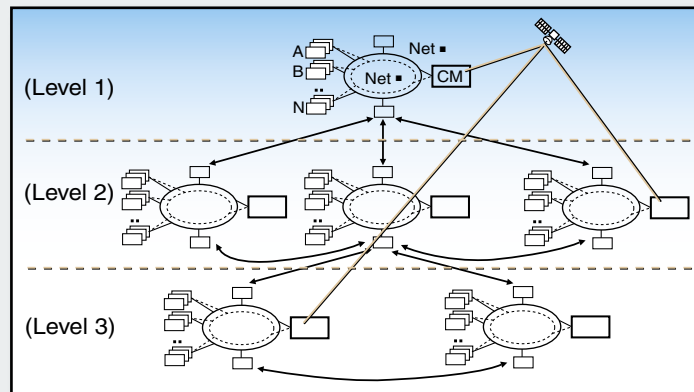


Figure 3. Characterizing Specific Bandwidth Capacities by Terminal and Networks Employed at Various Echelons. The figure above illustrates echelon-level networks and their connectivity to other echelons by direct line of sight connections (in black) and satellite connections (in gold) across echelons.

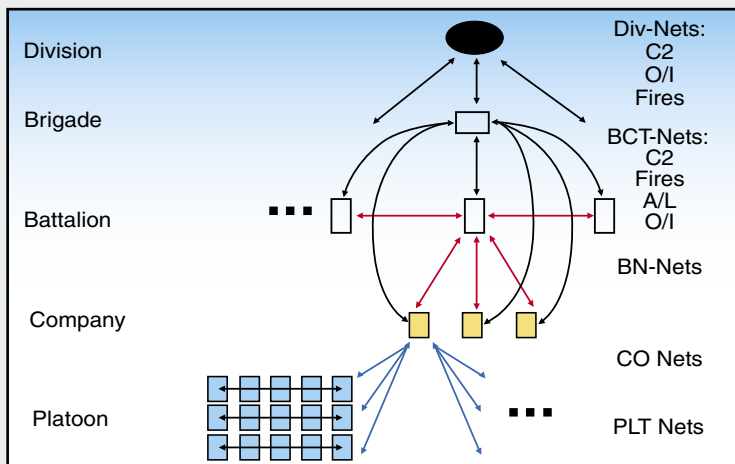


Figure 4. Examples of Typical VHF Radio Nets Identified in Use During OIF Major Combat Operations. The figure above illustrates echelon-level networks and their connectivity to other echelons by direct line of sight connections (in black) and satellite connections (in red) across echelons.