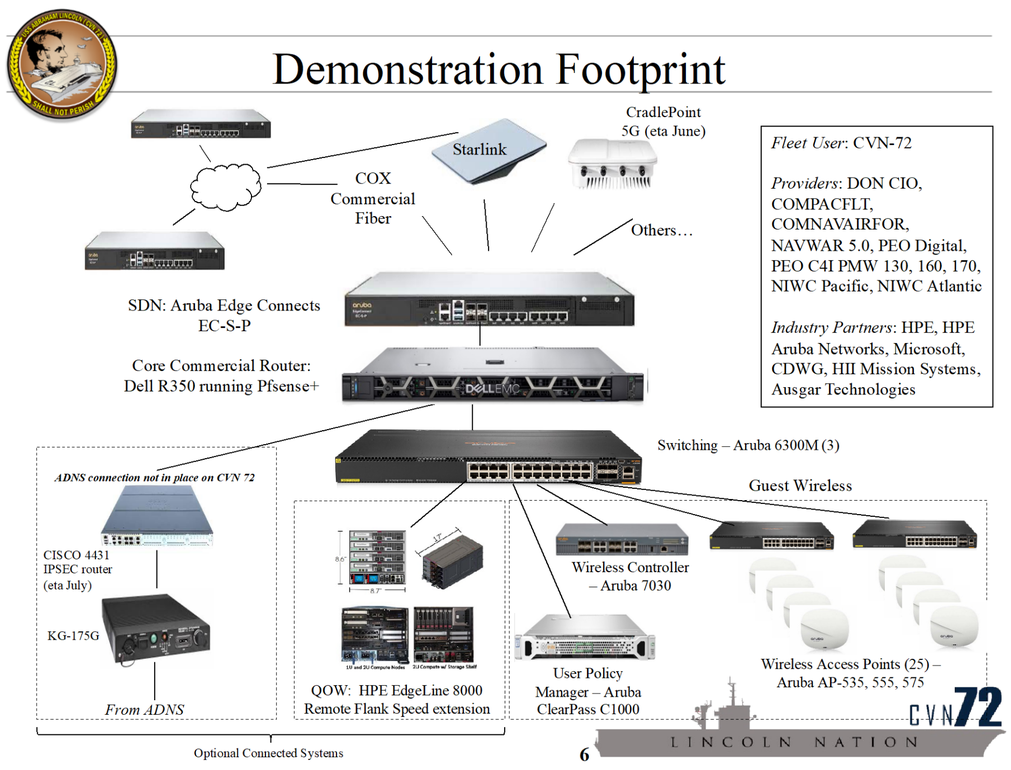
BUSINESS CASE ANALYSIS (BCA) OF USS ABRAHAM LINCOLN (CVN-72) INTERNET CONNECTIVITY AT SEA AND IN-PORT

NAVAL POSTGRADUATE SCHOOL

Abstract

Internet connectivity aboard U.S. Navy ships has been historically unreliable and slow, both at sea and in-port. In order to remedy that problem, nuclear powered aircraft carriers (CVN) have been experimenting with Starlink satellite internet and 5G cellular internet to increase bandwidth for improved Quality of Work (QoW) and Quality of Life (QoL).

This thesis includes a Business Case Analysis (BCA) for different methods of internet connectivity, at sea and in-port, and attempts to identify the most cost-effective way to deliver the most bandwidth to CVN-72 at all times. The BCA uses the Net Present Value (NPV) method to quantify the cost of having contiguous internet access at sea and in-port and compares that value with the monetized benefits of having high speed internet. The purpose of this BCA is to determine what value the Navy gains (if any) by having internet access available to sailors at all times.



What is the best path to provide internet connectivity in hull?

Methods

- Three alternatives considered:
  1. Starlink at sea with COX fiber internet in port
  2. Starlink at sea with 5G/LTE cellular internet in port
  3. Starlink both at sea and in port
- Net Present Value (NPV) analysis used to quantify the net value of all costs and benefits over a ten-year period
- Quality of Life (QoL) benefits calculated using an estimation of sailors' Willingness To Pay (WTP) for internet services
- Quality of Work (QoW) benefits calculated based on studies of productivity gains experienced by firms after adoption of internet technology
- All costs and benefits discounted at 1.5% annual rate to provide NPV

Results & Their Impact

Alternative 1: $22,598,921
Alternative 2: $22,481,108
Alternative 3: $18,541,160

- Alternative 1 has the highest NPV based on lowest costs
- QoW benefits alone provide Net Benefit to all alternatives

Alternative 1: Starlink at Sea, COX Fiber in Port
(numbers in dollars)

Year	0	1	2	3	4	5	6	7	8	9	10
COSTS											
Starlink Hardware	$12,280				$18,420				$18,420		
Starlink Data Rate Plan		$630,000	$630,000	$630,000	$630,000	$630,000	$630,000	$630,000	$630,000	$630,000	$630,000
COX Fiber Unlimited Data Plan		$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000
TOTAL COSTS	$12,280	$640,000	$640,000	$640,000	$658,420	$640,000	$640,000	$640,000	$658,420	$640,000	$640,000
BENEFITS											
QoL 10 Mbps		$2,174,199	$2,174,199	$2,174,199	$2,174,199	$2,174,199	$2,174,199	$2,174,199	$2,174,199	$2,174,199	$2,174,199
QoW		$921,283	$921,283	$921,283	$921,283	$921,283	$921,283	$921,283	$921,283	$921,283	$921,283
TOTAL BENEFITS	$0	$3,095,482	$3,095,482	$3,095,482	$3,095,482	$3,095,482	$3,095,482	$3,095,482	$3,095,482	$3,095,482	$3,095,482
NET BENEFIT	($12,280)	$2,455,482	$2,455,482	$2,455,482	$2,437,062	$2,455,482	$2,455,482	$2,455,482	$2,437,062	$2,455,482	$2,455,482
PRESENT VALUE	($12,280)	$2,419,194	$2,383,442	$2,348,219	$2,296,161	$2,279,326	$2,245,642	$2,212,455	$2,163,407	$2,147,545	$2,115,808

NET PRESENT VALUE (NPV)	$22,598,921

Sample NPV calculations for Alternative 1 for a 10 year lifespan

Acquisition Research Program
www.acquisitionresearch.net

Daniel S. Tsuji, Lieutenant, USN
Marcus B. Padilla, Lieutenant, USN
Hsiao-wei Wang, Major, Taiwan Army
Advisors: Dr. Nicholas Dew
Dr. Amilcar Menichini