



ARMER

Allied Radio Matrix for Emergency Response





MnDOT Office of Statewide Radio Communications (OSRC)

Overview - Summary and Background

For SECB Strategic Planning Session

Sept 2014

Mukhtar "mook-tar" Thakur and Tim Lee





403.36 STATEWIDE RADIO BOARD.

Subd. 1e. Implement plan and establish statewide system.

The Statewide Emergency Communications Board has overall responsibility for the statewide, shared radio and communication system project plan.

The commissioner of public safety shall implement the plan adopted by the Statewide Emergency Communications Board.

Commissioner of transportation to construct, own, operate, maintain, and enhance the elements of the backbone system defined in the plan.





MnDOT

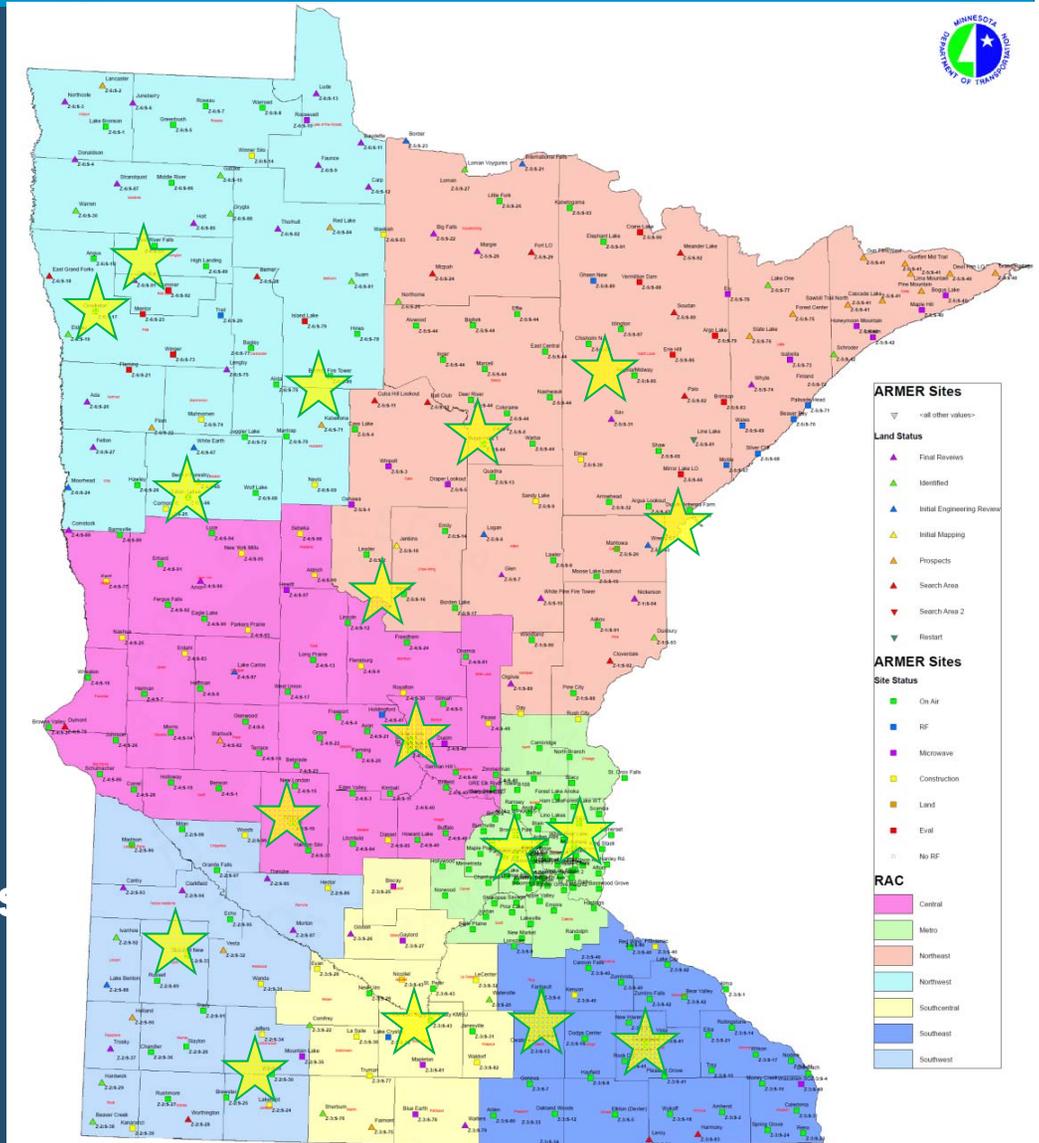
Office of Statewide Radio Communication

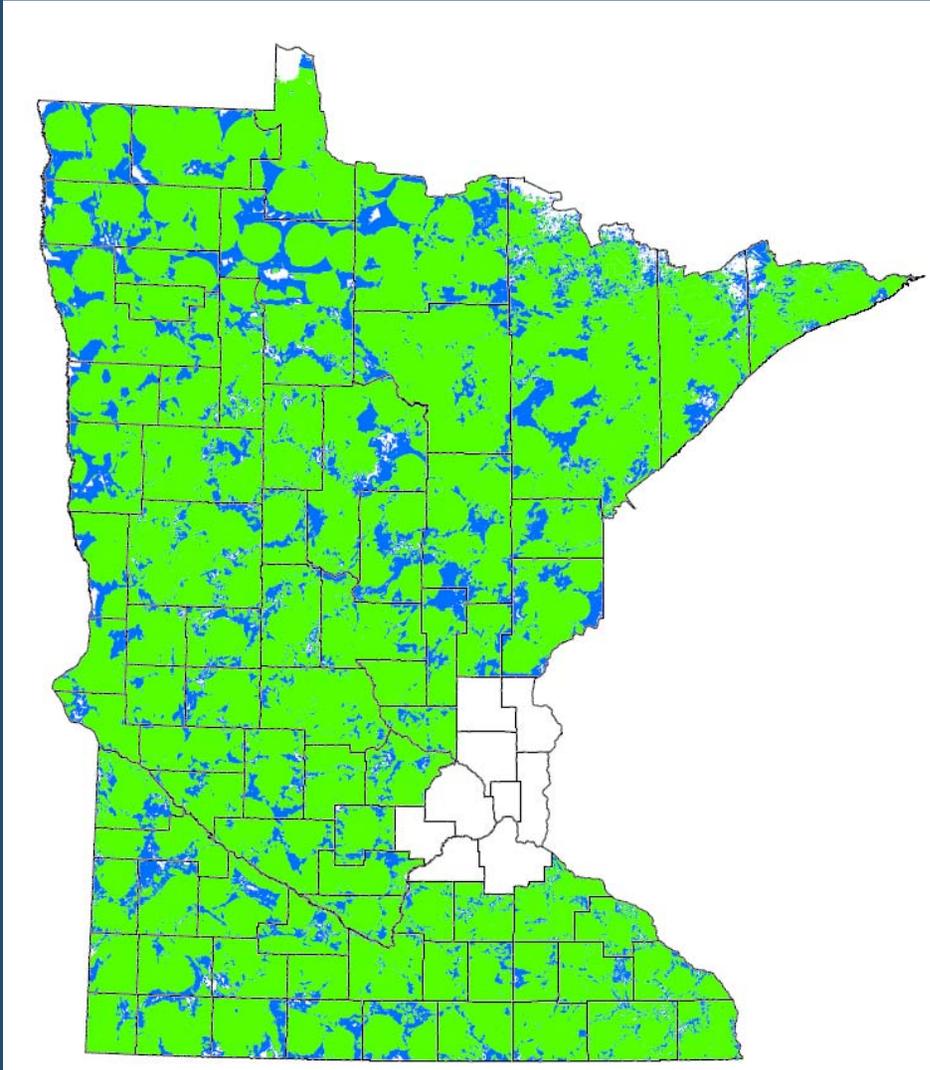
Main Office in Roseville

17 Radio Shops across the state

Current staff of 87

- 9 Office Management/Support
- 16 Electrical/Radio Engineers
- 5 Radio Maintenance Supervisors
- 55 Radio Technicians
- 2 Tower Technicians
- 1 MnIT System Administrator





800 MHz Trunked
Project 25 system
(Motorola Smart
Zone 7.13)

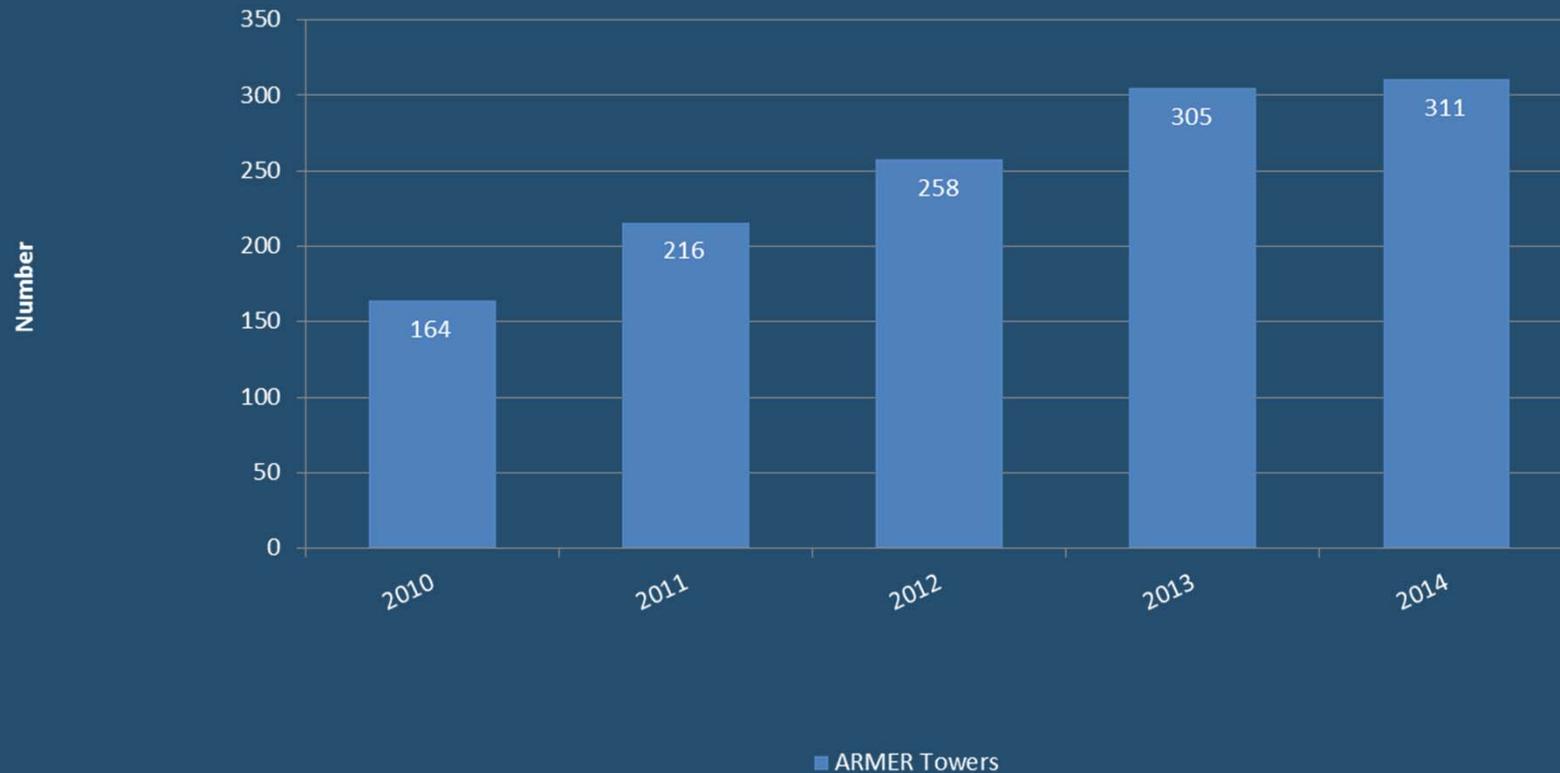
State Backbone
designed for
mobile coverage of
the 95% area in
each county.





Snapshot of Progress 1

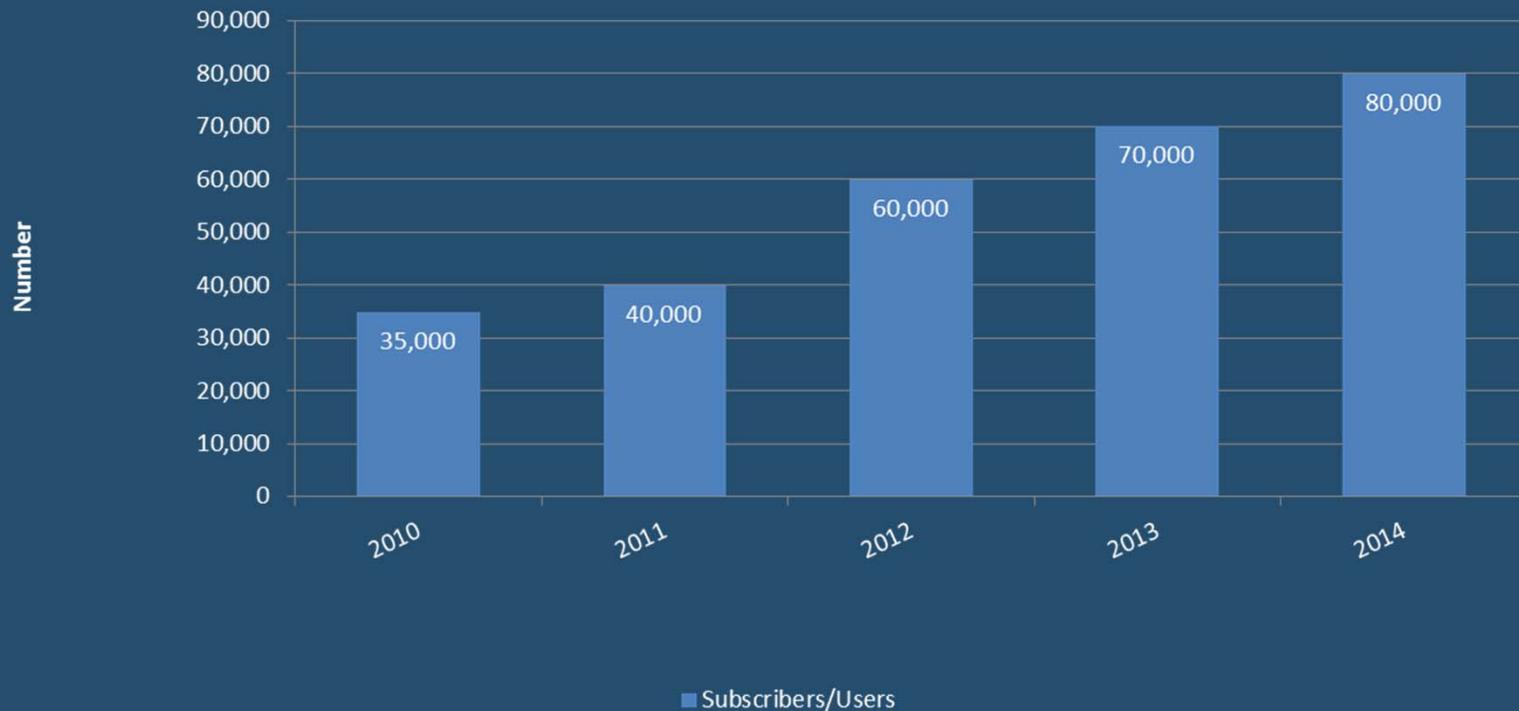
ARMER towers constructed and operational





Snapshot of Progress 2

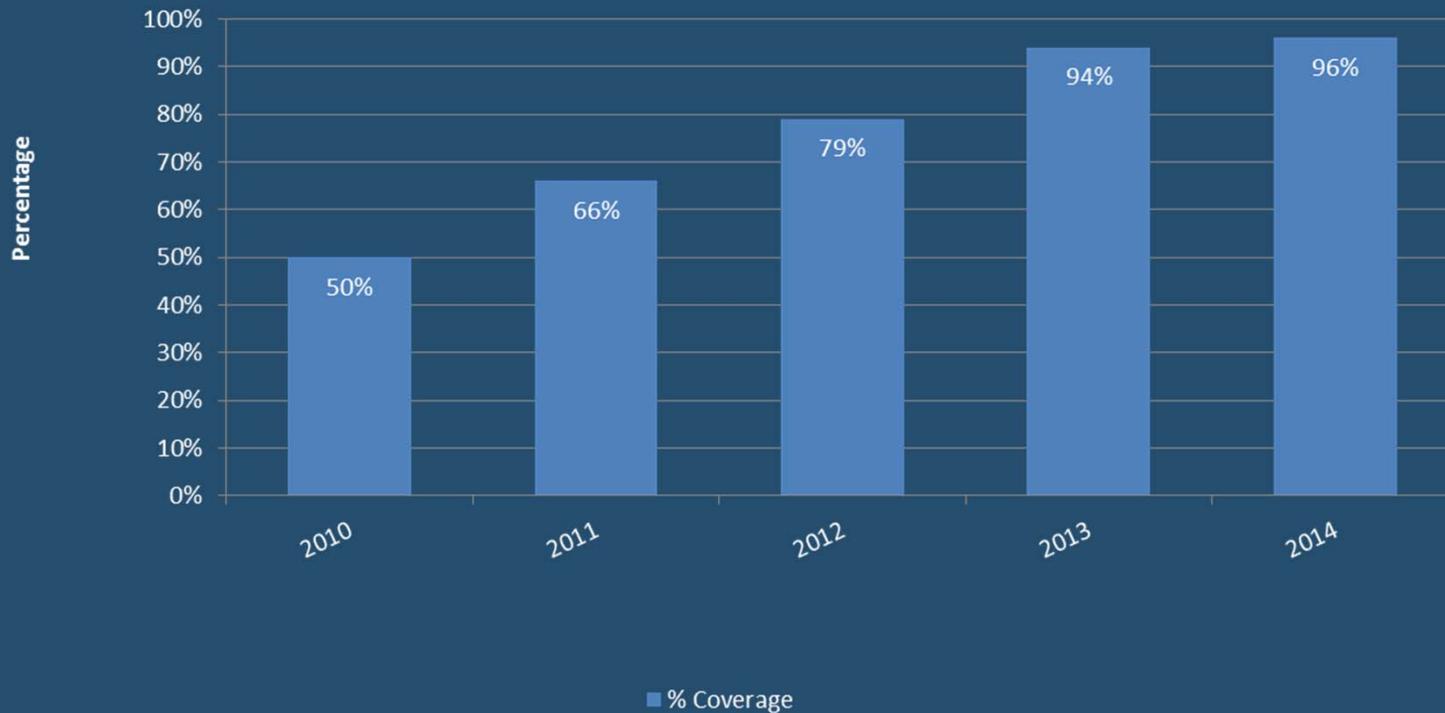
ARMER subscribers/users on the system





Snapshot of Progress 3

ARMER- % of Sites Completed





ARMER Site Status

	Total Planned MnDOT ARMER RF Sites	MnDOT ARMER RF Sites On the Air	Under Construction	Local Enhancement Sites On the Air
North West Region	58	55		
North East Region	96	88	13	6
Central Region	52	52		16
Metro Region	28	28		46
South West Region	31	31		5
South Region	22	22		4
South East Region	37	37		12
TOTAL:	324	314	13	89





ARMER Backbone Construction Funds

Phase 1 (Metro)

- Trunk Highway Funds (THF) \$ 7,500,000
- GO Bonds \$ 7,500,000
- Metro Council \$ 3,000,000
- 911 Backed Bonds \$ 16,000,000

Phase 3

- 911 Backed Bonds \$ 45,000,000

Phase 456

- Land pre-work 911 Cash \$ 3,000,000
- 911 cash/bonds \$186,000,000

6.0 System Upgrade

- 911 cash \$ 5,100,000

SECB Funds(911 cash)

- Day site \$ 1,000,000

Additional MnDOT

- A-D Conversion THF \$ 21,000,000

TOTAL: \$295,100,000





Monthly ARMER Report Construction Budget Balance

This report shows the remaining unencumbered balance of the ARMER construction Funds and the remaining work to complete the project plan.

ARMER Construction Budget (Remaining Work)					
Unencumbered Fund Balance (As of September 2014)					\$17,582,073.68
Site Name (Green - site on air)	County	Description	Land/ Construction	Estimate to Complete	Balance
Lutsen	Cook	Replace Shelter	Ready	\$175,000.00	\$17,407,073.68
Tower	St Louis	Add Shelter/site work	Ready	\$150,000.00	\$17,257,073.68
Beaver Bay	Lake	Replace Tower	Ready	\$630,000.00	\$16,627,073.68
Argo Lake	St Louis	New tower	Ready	\$585,000.00	\$16,042,073.68
Palo	St Louis	New tower	Ready	\$710,000.00	\$15,332,073.68
Soudan	St Louis	New tower	Ready	\$710,000.00	\$14,622,073.68
Berner	Clearwater	New tower	Envir/Purc	\$610,000.00	\$14,012,073.68
Island Lake	Beltrami	New tower	Envir/Purc	\$610,000.00	\$13,402,073.68
Cromwell	Carlton	New tower	Envir/Purc	\$735,000.00	\$12,667,073.68
Duluth South	St Louis	New tower	Lease	\$280,000.00	\$12,387,073.68
Finland	Lake	Replace Tower	DNR/Envir	\$710,000.00	\$11,677,073.68
Cascade River	Cook	New tower	DNR/Envir	\$790,000.00	\$10,887,073.68
NE Lake County	Lake	New tower	DNR/Envir	\$840,000.00	\$10,047,073.68
Lima Mt	Cook	New tower	DNR/Envir	\$1,340,000.00	\$8,707,073.68
Sawbill	Cook	New tower	DNR/Envir	\$1,390,000.00	\$7,317,073.68
Devil Fish	Cook	New tower	DNR/Envir	\$640,000.00	\$6,677,073.68
Red Lake	Beltrami	New tower	Indent Land	\$630,000.00	\$6,047,073.68
Eden Valley	Meeker	New tower	Envir/Lease	\$500,000.00	\$5,547,073.68
Lake Crystal	Blue Earth	New tower	Indent Land	\$625,000.00	\$4,922,073.68
Madelia	Watonwan	New tower	DOT/Envir	\$610,000.00	\$4,312,073.68
Molde	St Louis	Replace fire tower	DNR/Envir	\$320,000.00	\$3,992,073.68
PENDING WORK					
Card Key				\$500,000.00	\$3,492,073.68
Site clean up, shelter and tower removals				\$400,000.00	\$3,092,073.68
Hewitt: Land Purchase, replace tower.				\$350,000.00	\$2,742,073.68
Scandia: Need to look at land purchase.				\$120,000.00	\$2,622,073.68
Geneva: Need to look at land purchase, new tower ?				\$60,000.00	\$2,562,073.68
Mapleton: Find land and build new tower				\$500,000.00	\$2,062,073.68
Red Wing: Land purchase				\$100,000.00	\$1,962,073.68
MSO - Backup equipment				?	
Microwave DC power - Upgrades to meet run time required				\$900,000.00	\$1,062,073.68
TOWER REPLACEMENTS (This work being held until above projects completed)					
Russell		Replace tower		\$600,000.00	\$462,073.68
Freedhem		Replace tower		\$600,000.00	-\$137,926.32
Middle River		Replace tower		\$600,000.00	
Hawley		Replace tower		\$600,000.00	
Theif River Falls		Replace tower		\$600,000.00	
Windom		Replace tower		\$600,000.00	
Virginia		Replace tower		\$600,000.00	
Cass Lake		Replace tower		\$600,000.00	
Viola		Replace tower		\$600,000.00	
Kimball		Replace tower		\$600,000.00	
Hoffman		Replace tower		\$600,000.00	
New London		Replace tower		\$600,000.00	
Woodland		Replace tower		\$600,000.00	
Littlefork		Replace tower		\$600,000.00	
Roosevelt		Replace tower		\$600,000.00	





ARMER Construction Elements

The ARMER Backbone Construction Included:

- Radio Sites (Towers, Equipment Shelters, Generators, HVAC, etc.)
- Backhaul Connectivity (Microwave radios, Fiber, Alarms systems, Cross connect Switches, etc.)
- Motorola 800 MHz Trunked Radio System
- VHF Interop System





ARMER Backbone Operations and Maintenance

Office of Statewide Radio Communications Operating Budget

- Trunk Highway Fund : \$ 5,168,000 Used toward ARMER: \$ 2,600,000
- 911 Fund transfer: \$ 9,650,000 Used toward ARMER: \$ 9,650,000
- Tower Rent and billed services: \$ 450,000 Used toward ARMER: \$ 350,000

Total yearly MnDOT ARMER operating budget: \$ 12,600,000





ARMER Backbone Operations and Maintenance Annual Spending

Salaries	\$4,347,000.00	34.50%
Oncall/Overtime	\$282,500.00	2.24%
Motorola SSA/SUAll	\$3,900,000.00	30.95%
Rent & Utilities	\$1,612,000.00	12.79%
Repairs	\$700,000.00	5.56%
Equipment Replacements	\$725,000.00	5.75%
Professional/Technical Services	\$50,000.00	0.40%
Purchased Services	\$150,000.00	1.19%
Communications	\$68,750.00	0.55%
Travel	\$70,000.00	0.56%
Vehicles	\$75,000.00	0.60%
Supplies	\$417,500.00	3.31%
Training	\$35,000.00	0.28%
IT	\$167,500.00	1.33%
Total	\$12,600,250.00	





Future ARMER System Challenges

- Coverage and Capacity
- System Reliability
- New Functions/Features
- Added system or user requirements
- System Upgrades/Lifecycle
 - Motorola System, Microwave, Facilities, VHF Interop





Motorola ARMER System Support/Upgrades

The ARMER System Utilizes a Motorola ASTRO 25 SmartZone system as the backbone of our 800MHz statewide radio system.

- 6 zone controllers master switching sites
- Approx. 410 radio repeater sites
- Over 570 Dispatch Console positions

The Motorola piece of the system is one of the larger operating cost of the system.

We have a very large system that has equipment owned by multiple agencies, as the system vendor does upgrades to the entire system it's all at once. We cannot have part of the system go and the others come later, we all have to go together.

With the upgrade schedule the vendor supplied and the all the different agencies having different budget cycles and budget constraints how do we keep us all together and move forward?





ARMER System Upgrades

History of Motorola System Upgrades

<u>System Version</u>	<u>When</u>	<u>Upgrade Cost</u>	<u>Annual SSA/SMA/SUA Cost</u>	<u>Notes</u>
V5.1 = Initial Release	1/1/2000			Circuit Based System
V6.0 = Upgrade in May	5/1/2001	\$0	\$0	Beta IP Based System
	2002	\$0	\$0	System Acceptance
V6.1 = Upgrade	2/1/2003	\$0	\$0	Initial Warranty Expires after 6.1 Upgrade
V6.3 = Upgrade in June	1/1/2004	\$70,706	\$1,600,000	Start of 1st SSA Contract, MRB Paid Upgrade cost
V6.5 = Upgrade in June	1/1/2005	\$236,630	\$1,202,998	54% MnDOT Cost split, removed monitoring
V6.8 = Upgrade in November	1/1/2006	\$214,000	\$1,404,798	2 Zone System, State Paid
	1/1/2007	\$0	\$1,824,528	4 Zone System
V7.2 = Upgrade - in January	1/1/2008	\$5,400,000	\$2,139,662	Major Upgrade, Legislation Request for funding approval
V7.5 / 7.7 = Upgrade in April	1/1/2009	??	\$2,451,839	
	1/1/2010	\$0	\$3,371,462	
V7.9 = Upgrade in May	1/1/2011	\$833,199	\$3,799,977	State Paid
	1/1/2012	\$0	\$3,678,112	Subscriber Support Fee dropped
V7.13 = Upgrade in May	1/1/2013	\$5,923,405	\$3,940,293	SMA - Cost of uprade covered if we agree to SUA II for 2014, 2015.
	1/1/2014		\$5,447,312	SUAII
Upgrade to 7.15 planned 2016	1/1/2015		\$5,539,112	SUAII
Not covered under SUA	Approximations !!!!			
Gold Elite	200-300			Do Prior to upgrade to 7.15
Quantar Sites	5 sites	Hennepin=1, Stearns=4		Do Prior to upgrade to 7.19
STR3000 Channels	996	134 = State, 862=Local Add ons		Do Prior to upgrade to 7.19
Conversion of Circuit Simulcast to IP Simulcast		16 simulcast subsystems		Do Prior to upgrade to 7.19





Motorola ARMER System 10 Year Lifecycle Plan

ARMER NETWORK LIFECYCLE FINANCIAL PLAN Updated 8.2.12

ARMER UPGRADE CADENCE	7.9-7.13		7.13-7.15		7.15-7.17		7.17-7.19		7.19-7.21		Total
Fiscal Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	
Support and Maintain											
Technical Support											
Dedicated FSO	\$ 1,107,703	\$ 1,247,312	\$ 1,059,494	\$ 1,091,278	\$ 1,124,017	\$ 1,157,737	\$ 1,192,469	\$ 1,228,243	\$ 1,265,091	\$ 1,303,044	\$ 11,776,388
Security Update Service											
Support and Maintain Subtotal	\$ 1,107,703	\$ 1,247,312	\$ 1,059,494	\$ 1,091,278	\$ 1,124,017	\$ 1,157,737	\$ 1,192,469	\$ 1,228,243	\$ 1,265,091	\$ 1,303,044	\$ 11,776,388

Technology Refresh											
Upgrade Schedule	7.9-7.13		7.13-7.15		7.15-7.17		7.17-7.19		7.19-7.21		
Via SMA											
Software	\$ 2,832,500	\$ 2,832,500	\$ 2,832,500	\$ 2,832,500	\$ 2,832,500	\$ 2,832,500	\$ 2,832,500	\$ 2,832,500	\$ 2,832,500	\$ 2,832,500	\$ 28,325,000
Hardware refresh + Implementation*	\$ 5,923,405		\$ 6,315,205		\$ 5,923,405		\$ 6,315,205		\$ 5,923,405		
*2013 price includes GPIOM to VPM Console upgrade											
SMA Total	\$ 8,755,905	\$ 2,832,500	\$ 9,147,705	\$ 2,832,500	\$ 8,755,905	\$ 2,832,500	\$ 9,147,705	\$ 2,832,500	\$ 8,755,905	\$ 2,832,500	\$ 58,725,625

Via SUA II											
Software	included										
Hardware refresh + Implementation	included										
GPIOM to VPM & future Console upgrades	included										
SUA II Total	\$ 4,200,000	\$ 42,000,000									

Proposed Lifecycle											
SUA (2013 only)	\$ 2,832,500										
SUA II 2014-2022		\$ 4,200,000	\$ 4,200,000	\$ 4,200,000	\$ 4,200,000	\$ 4,200,000	\$ 4,200,000	\$ 4,200,000	\$ 4,200,000	\$ 4,200,000	\$ 40,632,500
Proposed Grand Total	\$ 3,940,203	\$ 5,447,312	\$ 5,259,494	\$ 5,291,278	\$ 5,324,017	\$ 5,357,737	\$ 5,392,469	\$ 5,428,243	\$ 5,465,091	\$ 5,503,044	\$ 52,408,888

Grand Total - Via SMA	\$9,863,608	\$4,079,812	\$10,207,199	\$3,923,778	\$9,879,922	\$3,990,237	\$10,340,174	\$4,060,743	\$10,020,996	\$4,135,544	\$70,502,013
Grand Total - Via SUA II	\$5,307,703	\$5,447,312	\$5,259,494	\$5,291,278	\$5,324,017	\$5,357,737	\$5,392,469	\$5,428,243	\$5,465,091	\$5,503,044	\$53,776,388

* This information is intended for planning and budgeting purposes only. Exact quotes to be developed at time of contract.





Motorola ARMER System Support/Upgrades

We are at a point when we need to decide what level of upgrades and support we want from Motorola.

Some of the Motorola support options are:

- No yearly Motorola Service Contract
- Limited yearly Motorola Services Contract
- Yearly Motorola SMA Contract
- Yearly Motorola SUAll Contract
- Yearly Motorola SUA(5) Contract





Motorola ARMER System Support/Upgrades

The upgrade plans require major system upgrades by the state and local agencies that are not covered under our previous SMA/SUAII Agreements:

- 200-300 Gold Elite need to be replaced prior to v7.15 (~2016)
- 5 sites of Quantar (1 – Hennepin County and 4 – Stearns County) need to be replaced prior to v7.19 (~2019)
- STR3000 replacement (~ 134- State, ~862 Local Agency) need to be replaced prior to v7.19 (~2019)
- Convert all circuit based simulcast to IP based Simlcast prior to v 7.19 (~ 2019)





Motorola ARMER System Support/Upgrades

Our current Motorola system/software services contract runs through the end of 2015. We need to decide what level of Motorola system/software support we want for 2016 and beyond. A decision needs to be made by early 2015 so we can start the work to get the appropriate contract in place for 2016.

