WyoLink Operations Work Group
September 22, 2006

1. Reviewed portable radio testing results with Laramie County Sheriff, Cheyenne Police department, Cheyenne Fire Department and County Commissioner. The test results were broken down into on-street and in-building testing.

The radio testing results will be discussed later in this meeting. The work group would like for the commission to allow the WyoLink Operations Work group to continue to work with the Laramie County public safety agencies to decide on what the expected portable radio coverage is expected in Cheyenne. From there the expected coverages would be given to Motorola for them to engineer possible solutions and the expected costs for each solution. Those solutions would be brought back to the commission for final review and determination.

2. Reviewed the radio sites in Hot Springs County. 3 Mile Hill and Cedar Ridge are currently on the 57 site list for WyoLink. The Work group reviewed the propagation studies for these sites and a Verizon site. Tom Mahon will contact Hot Springs County Sheriff and the fire department to review there present radio sites and coverages. The sites will remain on the 57 site list.

3. The work group reviewed the propagation studies for Medicine Mountain, Clayton and Pinkham. Medicine Mountain is located on the west side of the Big Horn Mountains and is currently a VHF site for Big Horn County. This site would provide coverage for the big Horn Mountains and Big Horn County.

Clayton is a Forest Service site in Park County and would help provide radio coverage in western Park County.

Pinkham is a site in Colorado that would help provide coverage into southern Carbon and Albany Counties.

The WyoLink Operations work group felt that these sites need more research before any decisions can be made.

SALECS 2006 STATISTICS

JANUARY 2006

	GAME & FISH	BRAND	LIVE STOCK AGENTS	BLM	STATE PARKS	OUT FITTERS	SDCI	FOREST	OT	TOTALS
EVENTS	454	134	10	32	53	0	1	31		715
TRAFFIC	5711	588	215	332	665	0	0	296	2	7809

FEBRUARY 2006

	GAME & FISH	BRAND	LIVE STOCK AGENTS	BLM	STATE PARKS	OUT FITTERS	SDCI	FOREST	OT	TOTALS
EVENTS	375	103	1	27	26	0	0	22	0	554
TRAFFIC	5237	409	134	368	469	0	0	218	2	6837

MARCH 2006

	GAME & FISH	BRAND	LIVE STOCK AGENTS	BLM	STATE PARKS	OUT FITTERS	SDCI	FOREST	OT	TOTALS
EVENTS	353	143	12	21	56	1	0	44	0	630
TRAFFIC	4171	468	171	269	522	8	0	377	1	5987

APRIL 2006

	GAME & FISH	BRAND	LIVE STOCK AGENTS	BLM	STATE PARKS	OUT FITTERS	SDCI	FOREST	OT	TOTALS
EVENTS	405	232	14	12	82	2	0	39	0	786
TRAFFIC	5180	682	192	184	850	10	0	343	2	7443

MAY 2006

	GAME & FISH	BRAND	LIVE STOCK AGENTS	BLM	STATE PARKS	OUT FITTERS	SDCI	FOREST	OT	TOTALS
EVENTS	529	351	20	28	278	0	0	33	0	1239
TRAFFIC	6668	1095	293	435	2903	0	0	384	7	11785

JUNE 2006

	GAME & FISH	BRAND	LIVE STOCK AGENTS	BLM	STATE PARKS	OUT FITTERS	SDCI	FOREST	OT	TOTALS
EVENTS	614	364	15	36	411	0	0	35	0	1475
TRAFFIC	5844	1089	233	317	4000	0	0	330	2	11815

JULY 2006

	GAME & FISH	BRAND	LIVE STOCK AGENTS	BLM	STATE PARKS	OUT FITTERS	SDCI	FOREST	OT	TOTALS
EVENTS	794	332	18	31	530	0	0	64	0	1769
TRAFFIC	7115	1102	230	399	4676	0	0	600	4	14126

AUGUST 2006

	GAME & FISH	BRAND	LIVE STOCK AGENTS	BLM	STATE PARKS	OUT FITTERS	SDCI	FOREST	OT	TOTALS
EVENTS	625	377	15	28	223	4	0	47	0	1319
TRAFFIC	7015	1235	192	279	2399	21	0	441	5	11587

SEPTEMBER 2006

	GAME & FISH	BRAND	LIVE STOCK AGENTS	BLM	STATE PARKS	OUT FITTERS	SDCI	FOREST	OT	TOTALS
EVENTS										0
TRAFFIC										0

OCTOBER 2006

	GAME & FISH	BRAND	LIVE STOCK AGENTS	BLM	STATE PARKS	OUT FITTERS	SDCI	FOREST	OT	TOTALS
EVENTS										0
TRAFFIC										0

NOVEMBER 2006

	GAME & FISH	BRAND	LIVE STOCK AGENTS	BLM	STATE PARKS	OUT FITTERS	SDCI	FOREST	OT	TOTALS
EVENTS										0
TRAFFIC										0

DECEMBER 2006

	GAME & FISH	BRAND	LIVE STOCK AGENTS	BLM	STATE PARKS	OUT FITTERS	SDCI	FOREST	OT	TOTALS
EVENTS										0
TRAFFIC										0

ANNUAL TOTALS FOR 2005

	GAME & FISH	BRAND	LIVE STOCK AGENTS	BLM	STATE PARKS	OUT FITTERS	SDCI	FOREST	OT	TOTALS
EVENTS	4149	2036	105	215	1659	7	1	315	0	8487
TRAFFIC	46941	6668	1660	2583	16484	39	0	2989	25	77389

Financial Reporting System

Administration & Information - Expense Budget Report

As of: 9/21/2006

Biennium: 2007-2008
Division: Information Technology

Fund: 001
Appropriation Unit: 400
Organization: 4053 PUBLIC SAFETY COMM COMM PSCC

(Exception = ***)

Object		Budget	Pre-Encumbrances	Encumbrances	Expenditures	Balance	Actual Percent Remaining	Expected Percent Remaining
0103	SALARIES CLASSIFIED	88,104	0.00	0.00	6,817.57	81,286.43	92.26 %	88.78 %
0105	EMPLOYER PD BENEFITS	28,144	0.00	0.00	3,187.15	24,956.85	88.67 %	88.78 %
	Series 100 Totals:	$116,248	$0.00	$0.00	$10,004.72	$106,243.28	91.39 %	88.78 %
0204	COMMUNICATION	1,555	0.00	0.00	149.76	1,405.24	90.36 %	88.78 %
0207	DUES-LICENSES-REGIST	230	0.00	0.00	0.00	230.00	100.00 %	88.78 %
0221	TRAVEL IN STATE	9,283	0.00	0.00	105.00	9,178.00	98.86 %	88.78 %
0230	SUPPLIES	0	0.00	0.00	20.00	(20.00)	0.00 %	88.78 %
0231	OFFICE SUPPL-PRINTNG	692	0.00	0.00	0.00	692.00	100.00 %	88.78 %
0292	MAINTENANCE CONTRACTS EXTERNAL	0	0.00	0.00	58.20	(58.20)	0.00 %	88.78 %
	Series 200 Totals:	$11,760	$0.00	$0.00	$332.96	$11,427.04	97.17 %	88.78 %
0901	PROFESSIONAL FEES	13,000	0.00	0.00	71.60	12,928.40	99.44 %	88.78 %
	Series 900 Totals:	$13,000	$0.00	$0.00	$71.60	$12,928.40	99.45 %	88.78 %
	Org Totals:	$141,008	$0.00	$0.00	$10,409.28	$130,598.72	92.62 %	88.78 %
	Division Totals:	$141,008	$0.00	$0.00	$10,409.28	$130,598.72	92.62 %	88.78 %

*** Spend rate exceeds expected rate

DAVE FREUDENTHAL
Governor

THE STATE OF WYOMING

Office of Homeland Security

Joe Moore
Director

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Herschler Bldg., First Floor East, 122 W. 25th St., Cheyenne, Wyoming 82002

September 5, 2006

Mr. Earl Atwood
ITD Administrator
Information Technology Division
2001 Capitol Avenue
Emerson Building, Room 237
Cheyenne, WY 82002

Dear Mr. Atwood:

This office would like to express our appreciation to Mr. Robert Symons of your staff who organized the recent *Tactical Interoperability Communications Plan* full-scale exercise successfully conducted August 18, 2006. As you are aware, the acceptance of federal funds for interoperative communications to support our ongoing efforts to thwart a terrorist attack and prepare for any type of natural or manmade disaster requires this type of performance. This office was recently advised by the U.S. Department of Homeland Security of our approval for the above program and currently we have completed the final stage, as required.

Mr. Symon's administering and providing critical guidance significantly contributed to the overall success of this endeavor. If this office can provide any assistance to you or your staff, please do not hesitate to contact me.

By means of this letter, please express my thanks to Mr. Symons for a job well done.

Sincerely,

Joe Moore
Director

JM/pn

Larry Majerus
Deputy Director

James McCameron
Bioterrorism Program Manager
(307) 777-5778

Kelly Ruiz
Public Information Officer
(307) 777-4909

Spectrum Workgroup Report
&
Federal Representative Report

Spectrum Workgroup

The amended draft of the 700 MHz Region 46 Plan will be presented to the Regional Plan Committee at the Wyoming APCO Conference for approval. There will also be an 800 MHz RPC meeting to update the progress on the 800 MHz re-banding effort. The 700MHz RPC Meeting will be held Monday November 13, 2006, at 2:00 PM at the Casper Holiday Inn on the River. The 800 MHz Meeting will 3:30 PM at the same location and day.

The NLECTC Midwestern Interoperability Summit will be held in Chicago on October 26 & 27. The SIEC Chairman and one other person from each State have been invited to participate in this Summit. Since Wyoming doesn't have a SIEC by FCC regulation that responsibility falls to the 700 MHz RPC. Bob Symons (PSCC Rep.) and I (700 MHz RPC Rep.) will attend. The Summit's purpose is to check the interoperability status of the nation and what needs to be done to improve the reported percentages. Bob and I will be giving a presentation on Wyoming's Interoperability Status.

Federal Representative Report

I attended the FPIC (Federal Partnership Interoperability Committee) Interoperability Committee meeting and the FPIC General Membership Meeting via conference call.

A draft FPIC Interoperability Assistance Work Plan for the State of Wyoming (see attached) was introduced and discussed at the FPIC Interoperability Committee meeting. The FPIC agreed (as part of their plan) to help Wyoming get Federal frequencies to replace the FCC Part 22 (IMTS Frequencies). We also requested a statewide frequency set with at least a 5 MHz separation. The FPIC committee had already identified some possible frequency sets that we could be used.

There is a FPIC Spectrum Committee meeting on Sept. 29th at 7am MDT; and I was specifically encouraged to participate since WY is on the agenda. They would really like to get WY's frequency requirements before then, in time to address them at this meeting. It was asked that we please send the Wyolink frequency plan to Jim Downes and Sandy McNulty as soon as it is available.

There was an extensive discussion about Key Management, and it was verified that Kent Drummond is WY's POC for that FPIC Committee. Northwest IWN project showed that even if you have a common key, you may not have interoperability because of other sticky programming/procedural issues. I explained that BLM's current plan is to download keys by dial-up modem from the Capitol Park Service KMR in D.C. It was explained that because Wyoming did not have any statewide, multi-agency encrypted communications before WyoLink, they do not have any key management procedures and administration experience to build on, and we are looking for a federal perspective for implementation here. Jim Downes said they were looking forward to P25 OTAR over trunking, and FPIC & Wyolink will be in dialog about that.

It was suggested that a new step in Table 1: "Approach", on page 4 of the draft work plan be added, between steps 3 & 4. They agreed to insert our recommendation of, "Manage Encryption: Establish AES encryption key management for federal uses."

It was stated there is a WY multi-agency exercise planned for the Torrington area around March 2007 that might be a good venue for the radio communications "Interoperability Testing" described in step 4 of Table 1. Bob Symons, who has participated in past FPIC conference calls, would be the best point of contact to incorporate FPIC testing needs in planning for that exercise; I'm told exercise planning is envisioned to start in November 2006.

During the FPIC General Membership Meeting the Draft Wyoming Interoperability Assistance Work Plan was introduced. The FPIC Chairman asked for comments on the Wyoming Plan and explained the frequency plan would be available for review by the next meeting.

There was a discussion about encrypting the trunking control channel. Apparently you can record the control channel and play it back later over the air and it will deny service to all legitimate users. The FPIC Security Committee will be working on a recommendation to be submitted to the manufacturers for comment.

The FPIC will develop contract language to be put in purchase orders to ensure the manufacturers comply with all current and future P25 standards, as the existing contract language was very hard to enforce.

WYO LINK

Wyoming's Statewide Public-Safety Interoperable Radio Communications System

Project Manager's Report to the PSCC

Date: September 26, 2006

Mr. Chairman,

I can report that the WyoLink project is moving forward, though not without challenges.

PROJECT-25 STANDARDS

First, I have been tracking the status of Project-25 standards. Standards development, though painstaking, is progressing.

The Intra-Sub-System Interface (ISSI) has recently been approved. This standard defines how one Project-25 system communicates with another system and is an essential component for expanding interoperability. At the recent APCO conference one manufacturer was demonstrating a Project-25 infrastructure that employed the ISSI to bridge systems and provide interoperable communications.

Word from the standards committee is that with the completion of the ISSI the Console Interface standard is anticipated within a year. The standard will define how Project-25 radio systems and dispatch consoles communicate. Adoption of this standard will increase opportunities for competitive procurement, as it will allow multiple manufacturers to produce radio dispatch consoles that will communicate with a Project-25 network, like WyoLink.

SUBSCRIBER EQUIPMENT

Second, I've been in communication with a number of manufacturers of Project-25 subscriber equipment. Some have come to Cheyenne to employ the WyoLink Pilot Phase system to demonstrate the functionality of their new production equipment. Others have used the system to shake out their prototype trunking features. As a result, WyoLink users will be gaining more choices and more competitive pricing in selecting subscriber equipment to fit their specific needs and budgets.

This, and the previous development, serves to confirm the wisdom of selecting Project-25 digital technology for the WyoLink infrastructure.

ZONE 2 & VERSION UPGRADE

As mentioned in the July PSCC Newsletter —

On June 27th WyoLink Project leadership and stakeholders accepted Motorola's proposal to upgrade from Astro-25 version 6.5 to version 7.2.

It is very advantageous to implement this upgrade at this stage of the WyoLink Project. Only the Pilot Phase equipment needs to be upgraded. Waiting would increase the cost of upgrading to version 7, as more equipment would have to be changed. All new equipment will ship with

the latest version. By acting now, the cost of this upgrade remains within the current project budget.

This upgrade offers advantages to WyoLink. Among these advantages are:

- *An extended lifecycle and simplified system architecture, which combined to reduce long-term maintenance costs and increase reliability.*
- *Support for the new IP-based dispatch console technology, which can reduce the cost of interconnect between a dispatch center and WyoLink, and provide true end-to-end encryption.*
- *Support for future implementation of pending Project-25 standards, such as the Console Interface Standard and Intra Sub-System Interface.*
- *Additional network security and faster software upgrade capability.*
- *Support for future implementation of wideband-high-speed data communications.*
- *Support for "Over The Air Programming" (OTAP), an option that will allow remote adjustment of subscriber equipment programming.*

Upgrading to version 7.2 offers WyoLink users greater flexibility and features, while holding the line on current cost and offering a lower long-term cost.

I have received and am reviewing the Detail Design documents that address the installation of the zone controller at Casper and the upgrade of the zone controller at Cheyenne. This equipment is presently scheduled to stage at the Motorola factory in December, with installation to begin thereafter. To facilitate the upgrade, the WyoLink system will have a short down-time, but as only trial use is taking place the impact will be minimal.

FREQUENCY PLANNING

Motorola continues work on the WyoLink frequency plan.

The Preliminary Frequency Plan document was delivered in July. That plan employs a mix of frequencies from the Public Safety pool (Part-90), the Business & Industry pool (Part-90), the Maritime service (Part-80), and frequencies formally allocated to paging and mobile telephone (Part-22). Indications are that the waivers necessary to use the Part-22 frequencies involve a very lengthy process. Therefore, we will be requesting federal frequencies to replace the Part-22 frequencies. It is evident from the Preliminary Frequency Plan document that the decision to extend the search for WyoLink frequencies to the entire VHF band was necessary for project success.

The Preliminary Frequency Plan has been undergoing in-depth evaluation and further site-specific engineering study on its way to becoming the Final Frequency Plan. As such, the plan has been changing. It has been necessary to rework the frequency selection for a few radio sites when intermodulation studies identified conflicts. This rework will delay the delivery of the Final Frequency Plan, which was to be completed by the end of September. I have directed Motorola that delivery of a frequency plan that fully considers all interference conflicts was of greater importance than adherence to the September deadline. The delivery date of the Final Frequency Plan has not been established.

Federal agencies will be receiving a report detailing the current state of the WyoLink frequency planning effort and specifying the site-specific need for federal spectrum. I understand the Federal agencies will be meeting this Friday, September 29, to evaluate spectrum donations to WyoLink. The willingness of federal agencies to contribute spectrum, as a quid pro quo for using the WyoLink system, is the best assurance that a complete and workable frequency plan will be delivered.

INFRASTRUCTURE DEVELOPMENT

I have included with this report an updated map of the WyoLink radio sites. This map shows the geographic areas for each phase of the project.

The areas previously described as Phase-4 and Phase-5 have been combined, as work in both areas is slated for next year and they will be managed as a single phase, Phase-4.

There will be a Phase-5 for the WyoLink project. For lack of a better term, this will involve "straggler" radio sites. There are sites where land acquisition may delay development. Likewise, additional sites to address coverage deficiencies will be in Phase-5 if the site acquisition and planning cannot be accomplished in time for Phase-4.

The table below describes the status of the radio sites in each phase of the project. You will note that some sites listed at the bottom of the table are locations yet to be determined.

Count		Site Name	Status
		Phase 1 Sites	**ALL SITES COMPLETED**
1	1	85 South	COMPLETED. Currently active in wide area trunking.
2	2	Sherman Hill	COMPLETED. Currently active in wide area trunking.
3	3	North Albin	COMPLETED. Currently active in wide area trunking.
4	4	Russell Hill	COMPLETED. Currently active in wide area trunking.
5	5	Whitcomb Hill	COMPLETED. Currently active in wide area trunking.
		Phase 2 Sites	**DESIGN COMPLETED; Construction Underway — All sites waiting for Final Frequency Plan, then combiners will be ordered.**
6	1	77 Hill	Antennas and RF equipment installed.
7	2	9-Mile Hill	Antennas installed. Waiting on new generator, then batteries can be moved, and then RF equipment will be installed in the occupied space.
8	3	Baggs Hill	Waiting for new tower. Waiting for new building.
9	4	Casper Mountain	Antennas and RF equipment installed.
10	5	Casper POE	Antennas installed. Waiting for new building
11	6	Church Buttes	Antennas and RF equipment installed.
12	7	Divide Hill	Waiting for new tower. Waiting on new generator, then batteries can be moved, and then RF equipment will be installed in the occupied space.
13	8	First Divide	Waiting for new side arm brackets to complete antennas. RF equipment is installed.

Count		Site Name	Status
14	9	Jade Mountain	Antenna work waiting on structural analysis to ensure the tower safety. RF equipment is installed.
15	10	Morton Hill	Antennas and RF equipment installed.
16	11	Muddy Gap Hill	Antennas and RF equipment installed.
17	12	Pine Ridge	Antennas and RF equipment installed.
18	13	Shirley Mountain	Antenna work waiting on structural analysis to ensure the tower is safe. Waiting on new building.
19	14	Strouss Hill	Antennas and RF equipment installed.
20	15	Virgin Hill	Antennas and RF equipment installed.
21	16	Waltman Hill	Antenna work waiting on tower guy-wire adjustment to allow increased tower load. RF equipment is installed. Waiting on new generator.
22	17	Aspen Mountain	Antenna work waiting on structural analysis to ensure the tower is safe. Waiting for new building.
23	18	Delaney Rim	Antenna work waiting on structural analysis to ensure the tower is safe. Waiting on removal of old microwave and radio equipment racks to provide space for WyoLink installation. New generator will be installed.
		PHASE 3 Sites	**Design Completed; Construction Pending completion of building and tower upgrades. Site acquisition complete.**
24	1	Banner Ridge	
25	2	Chicken Creek	
26	3	Lonetree	
27	4	Mount Pisgah	
28	5	Pumpkin Buttes	
29	6	Rozet Hill	
30	7	Tisdale Divide	
31	8	Tisdale Mountain	
32	9	Warren Peak	
33	10	Dead Indian	
		PHASE 4 Sites	**Design Underway — Proposed as Motorola turn-key install. Site acquisition complete, except as noted.**
34	1	Sage	
35	2	Aspen Ridge	
36	3	Cedar Mountain	
37	4	Copper Mountain	
38	5	Hogsback Ridge	

Count		Site Name	Status
39	6	Oyster Ridge	
40	7	Snow King	Site modification request underway.
41	8	Torchlight Hill	
42	9	Windy Ridge	
43	10	Geneva Summit	Site acquisition underway.
44	11	Narrows Hill	Site acquisition underway.
45	12	Rattlesnake Ridge	Site acquisition underway.
46	13	Salt Pass (new)	Site acquisition underway.
47	14	South Pass	Site acquisition underway.
48	15	Winkleman Dome	Site acquisition underway.
49	16	3 Mile Hill	Site acquisition underway.
X	17	Rendezvous Peak	Microwave only site on USFS land. Will require a new tower. Site lease in the process. Site acquisition underway.
X	18	McCullough Peaks	Microwave only site on BLM land. Complete new site. Site lease in the process. Site acquisition underway.
50	19	Medicine Mountain	Recently approved. Site acquisition beginning. Needs frequency plan. May move to Phase-5 depending on progress.
51	20	Pinkham Mountain	Recently approved. Site acquisition beginning. Needs frequency plan. May move to Phase-5 depending on progress.
		Phase 5 Sites	**Acquisition still in process; construction forecasted for 2008**
52	1	Signal Mountain	Design and Acquisition in process. Frequency plan in process.
53	2	Pow Wow Point	Design and Acquisition in process. Frequency plan in process.
54	3	Clayton Mountain	Recently approved. Site acquisition beginning. Needs frequency plan.
		Non-Specified Sites	The location of these sites is undetermined.
55	1	TBD undesignated	*VHF-57 site deleted due to redundancy.*
56	2	TBD undesignated	*VHF-57 site deleted due to redundancy.*
57	3	TBD undesignated	*VHF-57 site deleted due to redundancy.*
58	4	TBD contingency	*Budgeted contingency to address coverage deficiencies.*
59	5	TBD contingency	*Budgeted contingency to address coverage deficiencies.*
60	6	TBD contingency	*Budgeted contingency to address coverage deficiencies.*
61	7	TBD contingency	*Budgeted contingency to address coverage deficiencies.*
62	8	TBD contingency	*Budgeted contingency to address coverage deficiencies.*

	MCC 5500	Gold Elite Wireless	Gold Elite Wireline	MCC 7500
Connectivity to WyoLink	No direct connect to master site – done via Control Stations	No direct connect to master site – done via control stations	Multiple T1 to master site – minimum 1 full T1 per CEB and 1 for LAN	T1 to master site – less bandwidth then Gold Elite, but dependant on console resources. Can be multiple T1.
Availability	Currently shipping.	Factory orders accepted until 2009, then parts support for a minimum of (7) years from system shipment. No expansion of system after parts support in place.	Factory orders accepted until 2009, then parts support for a minimum of (7) years from system shipment. No expansion of system after parts support in place	Limited release 4Q05 Second release 4Q06
Encryption	Encryption to Control Station	Encryption to control station	Encryption through to MGEG	Encryption through console operator – true end to end encryption
Transmit Indication	Transmit indication on console is indication that control station has been instructed to transmit. Not a positive indication that audio has been processed through the repeater.	Transmit indication on console is indication that control station has been instructed to transmit. Not a positive indication that audio has been processed through the repeater.	Transmit indication on console is true indication of dispatcher voice being transmitted from repeater	Transmit indication on console is true indication of dispatcher voice being transmitted from repeater

	MCC 5500	Gold Elite Wireless	Gold Elite Wireline	MCC 7500
Emergency Alarm indication	Emergency indication requires PTT or "Hot Mic" on subscriber	Emergency indication requires PTT or "Hot Mic" on subscriber	If Emergency button has been pressed, dispatch console will light an indicator and sound an audible alarm.	If Emergency button has been pressed, dispatch console will light an indicator and sound an audible alarm.
PTT ID and Alias	ID and Alias display.	ID and Alias display.	ID and Alias for all trunked PTT. Alias and ID information come directly from User Configuration Database.	ID and Alias for all trunked PTT. Alias and ID information come directly from User Configuration Database.
Talkgroup Merge	Different talkgroups use different repeaters, even if control stations are patched together.	Different talkgroups use different repeaters, even if control stations are patched together.	If a patch or multiselect is performed by dispatch, talkgroups are merged into a 'supergroup' for the duration of the patch/multiselect. Uses less system resources per site.	If a patch or multiselect is performed by dispatch, talkgroups are merged into a 'supergroup' for the duration of the patch/multiselect. Uses less system resources per site.
Call Alert Paging	Can only receive call alert (decode)	Can only receive call alert (decode)	Call Alert Paging IDs can be pre-programmed into the console operator, and can be easily activated for rapid use.	Call Alert Paging IDs can be pre-programmed into the console operator, and can be easily activated for rapid use.

	MCC 5500	Gold Elite Wireless	Gold Elite Wireline	MCC 7500
Console Priority	No priority with control stations	No priority with control stations	Trunked console is hardwired to the trunked repeaters and has the ability upon console PTT to override the audio of a transmitting field unit replacing it with the console dispatcher audio	Trunked console is hardwired to the trunked repeaters and has the ability upon console PTT to override the audio of a transmitting field unit replacing it with the console dispatcher audio
Full Duplex	Half Duplex Only	Half Duplex Only	Can transmit and receive simultaneously. Field unit can reach dispatcher even while dispatcher is transmitting.	Can transmit and receive simultaneously. Field unit can reach dispatcher even while dispatcher is transmitting.
Interference	Console will be connected to separate control station for each talkgroup that is monitored. If multiple control stations transmit simultaneously in close proximity, it could potentially cause interference problems. VHF combiner required to minimize interference.	Console will be connected to separate control station for each talkgroup that is monitored. If multiple control stations transmit simultaneously in close proximity, it could potentially cause interference problems. VHFcombiner required to minimize interference.	Directly wired to controller, no RF interference issues.	Directly wired to controller, no RF interference issues.

	MCC 5500	Gold Elite Wireless	Gold Elite Wireline	MCC 7500
Faster System Access	Access time is dependant on RF link to repeaters instead of direct connect. If system is busy, access time can be affected.	Access time is dependant on RF link to repeaters instead of direct connect. If system is busy, access time can be affected.	Access time is significantly faster because of direct connection to controller.	Access time is significantly faster because of direct connection to controller.
Shared Resources			All other resources in Central Electronics Banks tied to the Master Site are available for use.	
Site Resources	Uses 1 trunked channel per talkgroup/control station affiliated to the system.	Uses 1 trunked channel per talkgroup/control station affiliated to the system.	Doesn't tie up system resources since tied directly in to the system	Doesn't tie up system resources since tied directly in to the system
Backroom Equipment	Yes – Central Electronics Shelves and wireless control stations/antenna systems	Yes – Central Electronics Banks, Server Computer and control stations/antenna systems	Yes – Central Electronics Bank and network equipment	Minimal (router and switch)
Logging	Done through backroom electronics	Done through LOMI/LORI	Can be done through LOMI/LORI or Centralized logging through MGEG/ATR server at master site	Centralized logging through Archiving Interface Server

	MCC 5500	Gold Elite Wireless	Gold Elite Wireline	MCC 7500
Configuration	Done locally through server	Done locally through server	Done remotely through server at Master Site	Done through network manager terminal location
Trunking IDs	Uses 1 trunking ID per control station	Uses 1 trunking ID per control station	Uses 1 trunking ID per trunking resource (talkgroup)	Uses 1 trunking ID per operator position
Conventional Operation	All types of conventional resources tie directly in to console backroom electronics	All types of conventional resources tie directly in to console backroom electronics	All types of conventional resources tie directly in to console backroom electronics	Analog conventional only, no signaling. Conventional resources link back via Conventional Channel Gateways (router)

Wyoming PSCC Cheyenne Range Test Report

General Information

In response to a request from the Wyoming Public Safety Communications Commission (PSCC), Motorola has performed a side by side by side range test on three communications systems now in use in the Cheyenne, Wyoming area.

The systems are (#1) LE1, the Cheyenne Police and Sheriff primary VHF analog repeater system used within Cheyenne, (#2) FD 800, the Cheyenne Fire Department's 800 MHz analog single site trunked radios system used for fire communications within Cheyenne and, (#3) WyoLink, the State-Wide VHF Astro 25 Digital Smartzone communications system,.

Project Identification

Identifying Name	PSCC RANGE TEST
Customer or Buyer	Wyoming Public Safety Communications Commission
Motorola Contact Person.	William Fleming. 2407 Creekwood Drive Fort Collins, CO 80525 970 416-0123
Customer Address (for correspondence)	Bob Symons PSCC Administrative Support 2001 Capitol Avenue Cheyenne, Wy. 82002 307 777-5065

Revision History

Date	Version	Author	Description
September 13, 2006	1.00	Schliep	Original

Test Methodology or Protocol

Measurements

The Delivered Audio Quality (DAQ) scale from 1 to 5 was used as the standard for judging audio quality. See Table below for definitions.

Table 1 – Delivered Audio Quality Definitions

DAQ Delivered Audio Quality	Subjective Performance Description
1	Unusable, speech present but unreadable.
2	Understandable with considerable effort. Frequent repetition due to noise / distortion.
3	Speech understandable with slight effort. Occasional repetition required due to noise / distortion.
3.4	Speech understandable with repetition only rarely required. Some noise / distortion.
4	Speech easily understood. Occasional noise / distortion.
4.5	Speech easily understood. Infrequent noise / distortion.
5	Speech easily understood.

*NOTE: In this test, no audio or a failed to respond test was also scored as a 1. There is no zero on the DAQ scale.

Tests were performed in cars, on the streets and inside a variety of buildings. Test results were simplified in this report to in-buildings or on-streets. In car results were reclassified as on-streets for this report.

Tests were to be performed using portable radios with speaker microphones. Transmit and receive test calls were to be made using the speaker microphone while the radio remained on the hip. There was variance from this procedure but the results were all reclassified as hip level speaker phone use for this report.

Specific buildings were designated to be tested and a variety of additional buildings were also tested. Some of the buildings would be classified as large although most buildings would fall within the classification of medium buildings. Classifications were according to the table 2 below.

Table 2 – Building Type Definitions

Building Type	Definition
Large	Large downtown building, large commercial building, or large enclosed shopping mall.
Medium	Small to medium size stores, small apartment buildings, or a small to medium size factory or office buildings.
Light	Residential buildings (1 and 2 story houses) and small commercial buildings.

Test Locations

Street maps of the City area were provided by the PSCC. These were divided up into zones and sectors. Tests were attempted in all zones and sectors.

Several sections of town were designated as of particular interest and were more heavily tested than grids of less interest. Grids and sectors of more interest were the Downtown area, the Del Range commercial area and the South Side Mobile home areas.

In addition, lists of specific buildings such as schools, government and commercial buildings were designated for in building testing.

Personnel Utilized for Testing

A PSCC person was assigned to the Cheyenne 911 center to monitor, judge and record communications on LE1 and the FD 800 MHz systems. Personnel from the dispatch center performed the communications traffic.

A Motorola engineer was assigned to the WyoLink Master site along with the WyoLink system administrator to communicate, judge and record traffic on the WyoLink system.

Each of the three field teams consisted of a Motorola representative, a County sheriff's deputy and/or a City police officer.

Field Equipment

Each field team had a LE1 portable, a FD 800 portable, a WyoLink portable, a map and a field-recording sheet set.

Each portable radio was equipped with a remote speaker microphone.

Fixed Systems Information

The LE1 infrastructure consists of an analog wideband VHF (@155Mhz) repeater located on Southwest Boulevard in the Southwest sector of Cheyenne. The antenna is located on an AM broadcast tower. The system has 5 voted receivers, one at the repeater site and 4 scattered about town. No condition testing was performed on the system.

The City of Cheyenne PD/Laramie County Sheriff allowed unlimited use of their primary channel, LE1.

The FD system is a mixed mode, 800 MHz, trunked radio system located behind the fire station at Fox Farm Road just west of the Holiday Inn, next to I-80. No condition testing was performed on the system.

Fire designated an unused talk group on the trunked system for test use.

The WyoLink Astro 25 Digital Smartzone system has two sites that provide coverage to the City of Cheyenne. They are the Highway 85 site, which is about 8 miles south of Cheyenne on Highway 85, and the Sherman Hill site located West of Cheyenne. These sites were optimized and accepted by WyoLink at the end of 2005.

WyoLink designated a talk group for testing on the Smart Zone system.

Testing and Results

On Day one of the testing the three teams dispersed to locations throughout the City. The personnel responsible for recording and judging the audio assumed stations at the two dispatch locations (LCCCC and the WyoLink Master site).

At each location chosen for testing the team members recorded the address and then made their test calls in to the dispatch personnel. This was the INBOUND recording. On each test the field team then recorded the response to the test as they heard it back out from dispatch. This was the Outbound recording.

At each location chosen for testing the team also put a dot on the map. As testing progressed the teams also recorded the test number at the dot.

After two days of driving and testing the sheets were turned in and a debriefing session held. All testers felt a viable test had been performed.

Test sheets results were transferred to a Master Test Results spreadsheet for analysis and the results standardized as noted. The Master sheet is attached.

The Master spreadsheet was imported into a mapping program and a variety of views of the data were produced. Maps were printed into Adobe PDF files for 11 X 17 paper printing. A subset of the map views is attached. A complete set of all map views has been forwarded to the PSCC on a CD.

Analysis of the Results

No analysis or conclusions about the data were requested and none are provided. Motorola conducted the tests as requested and has turned the data over to the PSCC for their use.

Leland Schliep
Senior Field Engineer
Motorola Communications

PSCC Officers and Commissioners

Chairman
- Chair quarterly meetings
- Review and Sign PSCC correspondence
- Serve on and chair Executive Board
- Attend or designate attendance at special meetings – limited
- Review PSCC minutes before distribution to commissioners
- Review committee meeting minutes
- Review PSCC Administrative Support position and PSCC activities with Executive Director and /or Administrative Support

Vice Chairman
- Serve as Chairman upon the absence of Chairman
- Serve on Executive Board
- Review PSCC minutes before distribution to commissioners

Secretary/Treasurer
- Serve on Executive Board
- Review PSCC minutes before distribution to commissioners

Working Groups Chairmen
- Preside over Working Group meetings
- Review minutes before distribution to members and Executive Board

Working Groups
- Executive Board
- Administration and Funding
- WyoLink Operations
- Spectrum
- Inter-Operability Executive
- State Agency Law Enforcement System (SALECS).

Commissioners
- Participate in assigned committee meetings via attendance or conference call
- Participate in Quarterly PSCC meetings