

Region 6 NPSPAC Repacking Engineering Report



September 9, 2005
Revision 1

Overview

This report describes the methodology and results of the “Repacking” of the Northern California Region 6 NPSPAC Channels. The purpose of the Repacking project is to configure the plan more efficiently to accommodate those agencies who requested additional spectrum. The Region 6 committee could use the information contained in this report to develop a plan for modification of the current Regional Plan which needs to be approved by the NAPCO agencies.

Description of the Region

The Regional Plan was adopted by the FCC on November 29, 1990 with four (4) subsequent revisions in 1992, 1994, 1998 and 2001. The Region is composed of 48 Counties of Northern California. There are thirty-seven (37) licensee holders within the region mostly concentrated in the San Francisco Bay Area.

Of the available two hundred and forty (240) channels spaced in 12.5 kHz increments within the NPSPAC band there are twenty-three (23) unassigned channels and thirty-seven (37) guard bands. Two (2) agencies have waivers to use wider emission for data.

Region 6 Repacking Window Opening

On July 24, 2005 the Northern California Region VI NPSPAC Review and Revision Committee announced the opening of an informal window for the purpose of obtaining user information from those in the Region who are interested in the frequency Repacking process. Requests for new or additional spectrum were due August 15th. Table 1 below summarizes the requests received.

Alameda County (in a joint East Bay RCS)	40-50
Contra Costa County (in a joint East Bay RCS)	40-50
Santa Clara City	2
San Jose	5
BARTD	4
San Francisco	14
Roseville	3
Hayward (by their consultant)	8
Santa Clara County	10 countywide + 10 in southern county

Table 1: Request for additional spectrum during the window opening

Basis for Reallocation

The underlying rules for the reallocation are as follows:

No Impact to Incumbent Licensees – Repacking should result in existing license holders with comparable system performance. Existing users should not lose either coverage or channels through cooperation in a repacking effort. Users who are using channels that are 20 kHz wide should continue to do so.

Protected Service Areas – Channel allocation should be on the basis of the user’s geo-political boundaries. In the case of users where the boundaries are not aligned with County and City boundaries, channel allocations should occur based on signal strength criteria for existing systems and proposed systems.

Standard Channel Spacing – Channel allocations should be spaced so that standard transmitter combining equipment can be used (see Table 2).

Additional Channel Allocation – The primary intent of this repacking study is to provide additional spectrum

Channel Grouping – It is anticipated that channels identified for P25 user the East Bay will be grouped such that the implementation of 12.5 KHz channels will result in additional channel efficiencies per the P25 frequency efficiency objectives while maintaining the system performance of other existing users per the rules above.

Table 2 - Number of Channels per Agency and Combiner information

Agency	# Channels	Combiner Spacing	# Combiners
Alameda County	21	150 kHz	2
Belmont	1	N/A	N/A
Campbell	1	N/A	N/A
Red Cross	1	N/A	N/A
*State of California Mutual Aid	12	N/A	N/A
*State of California CYA @ Stockton	4	250 kHz	1
*State of California CYA @ Yountville (Napa)	1	N/A	N/A
State of California CYA @ Ione	2	250 kHz	1
*Ceres	4	250 kHz	1
Contra Costa County	20	150 kHz	2
Contra Costa Data	1	N/A	N/A
Contra Costa Jail	3	N/A	N/A

Davis	4	250 kHz	1
Elk Grove School District	4	250 kHz	1
*Emeryville/Piedmont	1	N/A	N/A
Fresno	3	250 kHz	1
Livermore Amador Valley Transit	1	N/A	N/A
Lodi	1	N/A	N/A
Mountain View	1	N/A	N/A
*Nevada	8	250 kHz	2
Oakland, City	17	150 kHz	2
Palo Alto	1	N/A	N/A
Redwood City	1	N/A	N/A
*Regents of the University (State Wide)	5	250 kHz	1
Regents of the University (UC Berkeley)	2	250 kHz	1
Regents of the University (UC Davis)	2	250 kHz	1
Roseville	10	250 kHz	2
Richmond	8	250 kHz	2
Sacramento City	24	250 kHz	4
Sacramento County	25	250 kHz	4
Sacramento Fire	2	250 kHz	1
San Bruno	1	N/A	N/A
San Francisco - CERS	23	150 kHz	2
San Francisco – DPW	5	250 kHz	1
BART	11	250 kHz	-
San Joaquin Data	1	N/A	N/A
San Jose	2	250 kHz	1
Santa Clara City	8	250 kHz	2
Santa Clara County	3	250 kHz	1
Santa Clara Water	1	250 kHz	1
Stockton	5	250 kHz	1
Sunnyvale	1	N/A	N/A
*Turlock	6	150 kHz	1
Vacaville	6	250 kHz	1
Walnut Creek	1	N/A	N/A

*Channel allocation did not change from the current plan.

Northern California vs. Southern California Adj/Co Channel Criteria

In addition to using the Northern California criteria, Motorola evaluated the possibility of using the Southern California criteria for adj/co-channel allowance.

Northern California Reuse Criteria

1. Service Area: Received signal strength has been defined as the **40 dBu** boundary requirement.
2. Co-channel reuse users: **5 dBu** at the closest point to the service area of the existing system
3. Adjacent Channel: **25 dBu**.

Southern California Reuse Criteria

1. Service Area: Received signal strength has been defined as the **40 dBu** boundary requirement.
2. Co-channel reuse users: **20 dBu** at the closest point to the service area of the existing system
3. Adjacent Channel: **35 dBu**.

Due to the number, topography and the proximity of the licensees in the San Francisco Bay Area, systems are utilizing specialized antenna configurations allowing for adjacent channel utilization which otherwise could not be achieved. Due to this fact, Motorola has determined that modifying the reuse criteria to the Southern California plan would not produce any significant spectrum within the Bay Area.

Modifications to the Region 6 Plan

With the potential of narrowband 12.5 kHz systems within Region 6, Motorola would like to recommend the following modifications to the Northern California 800 MHz Regional Communications Plan (Region #6):

Section 5.12 Technical Design, Specific

“...In this regard, it is recommended that systems should be designed to provide a minimum of 40 dBu (decibels above 1 microvolt per meter – approximately 4.6

microvolts of signal across 50 Ohms at 850 MHz). This is accomplished to the degree possible while reducing interfering signals to other areas.

Using this 40 dBu signal as a standard criteria, it is possible to define “acceptable interfering signal levels.”

- Base Stations

Signals from co-channel base stations shall not exceed 5 dBu at any point within the geopolitical boundaries of affected users. Signals from next-adjacent-offset-channel base station shall not exceed 25 dBu at any point within the geo-political boundaries of affected users.” **If all adjacent agencies are meeting the narrowband P25 12.5 kHz emission mask, signals from the next-adjacent-offset-channels base station shall not exceed 60 dBu at any point within the geo-political boundaries of affected users.**

The 60 dBu would provide a 35 dB improvement over the current NPSPAC to NPSPAC 40/25 adjacent channel reuse and still provide adjacent channel protection.

Methodology

Motorola followed a structured process when performing the Region 6 Repacking study to ensure a robust plan was developed. The following steps outline the process.

1. Gathered FCC licenses of all users in Region 6 and verified information with customers.
2. Plotted dBu Contours using Northern California and Southern California adj/co channel criteria.
3. Determined who could be adj/co channel with whom using contours and current adj/co channel allocations.
4. Assigned spectrum following these requirements:
 - a. All new channels must fit into same number and type of combiner as old channels
 - b. For each agency, there must be the same number of channels in new plan as agencies are currently using.
5. Double-checked the feasibility of the plan with the local engineering team and verified agency information.

Results

The results of the Region 6 Repacking effort are summarized below. In addition, we have provided a depiction of the new plan in three ways: 1) in a spreadsheet format, sequential by frequency, 2) visually, in a complete Northern California Graphic, and 3) by agency, showing each new frequency.

1. Twenty (20) additional channels for East Bay P25 RCS for a total number of 58 channels which could be used to provide an interoperable solution for Alameda County, Contra Costa County, and the City of Oakland.
2. One (1) additional channel for the City of San Jose that is between guard bands and therefore is eligible to receive a waiver to operate in a wide band (25 kHz) configuration.
3. Two (2) additional channels for the City of Santa Clara.
4. All eleven (11) BART channels can be used from Contra Costa County to Santa Clara County.
5. The current frequency allocation does not change for the following agencies: American Red Cross Bay Area, State of California Mutual Aid, State of California CYA at Yountville (Napa), Emeryville/Piedmont, City of Fresno, City of Ceres, State of Nevada, Regents of UC state-wide channels (5 at all campuses), and City of Turlock
6. All Ten (10) channels for the City of Roseville meet the criteria of Adjacent and Co-channel.

Considerations for the Future

1. If San Francisco expands to a P25 system, there are six (6) additional channels that the agency could use.
2. If the County of Santa Clara defines the protected service area for southern part of the county they maybe able to find spectrum for that portion of the County.
3. Due to the proximity of other Bay Area licenses we were unable to find channels for the City of Hayward. The proposed East Bay P25 RCS would have sufficient capacity to support the City of Hayward users.

Frequency Information By Agency

*** - indicates currently licensed channel (no change from current plan)

FB = Fixed Base Station

MO = Mobile Receive Frequency

County of Alameda

FB: 21 channels

607	866.1
626	866.3375
629	866.375
708	867.4125
711	867.45
720	867.5875
723	867.625
733	867.75
736	867.7875
746	867.9125
749	867.95
760	868.1125
763	868.15
773	868.275 - ***
776	868.3125
796	868.5625
799	868.6
809	868.725

812	868.7625 - ***
824	868.9125
827	868.95

MO.: 31 channels

605	866.075
607	866.1
608	866.1125
612	866.1625
626	866.3375
629	866.375
634	866.4375
651	866.675
657	866.75
661	866.8
665	866.85
708	867.4125
711	867.45
720	867.5875

723	867.625
733	867.75
736	867.7875
746	867.9125
749	867.95
760	868.1125
763	868.15
766	868.1875
773	868.275 - ***
776	868.3125
796	868.5625
799	868.6
809	868.725
812	868.7625 - ***
821	868.875
824	868.9125
827	868.95

American Red Cross Bay Area

FB: 1 channel

622	866.2875 - ***
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MO : 1 channel

622	866.2875 - ***
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City of Belmont

FB: 1 channel

604	866.0625
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State of California

NTL. CALLING

FB: 1 channel

MO: 1 channel

601	866.0125 - ***
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601	866.0125 - ***
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CA LAW ENFORCEMENT MUTUAL AID RADIO SYSTEM (CLEMARS)

FB: 2 channels

MO: 1 channel

615	866.2 - ***
792	868.5125 - ***

792	868.5125 - ***
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INTERNATIONAL TACTICAL CHANNELS

FB: 4 channels

MO: 4 channels

639	866.5125 - ***
677	867.0125 - ***
715	867.5125 - ***
753	868.0125 - ***

639	866.5125 - ***
677	867.0125 - ***
715	867.5125 - ***
753	868.0125 - ***

NOR CA FIREMARS

FB: 1 channel

670	866.9125 - ***
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STATEWIDE FIREMARS

FB: 1 channel

MO: 1 channel

830	868.9875 - ***
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830	868.9875 - ***
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STATE OF CA MULTIPLE AGENCY RADIO SYSTEM

FB: 3 channels

MO: 3 channels

640	866.5375 - ***
716	867.5375 - ***
782	868.3875 - ***

640	866.5375 - ***
716	867.5375 - ***
782	868.3875 - ***

CYA at Stockton

FB: 4 channels

MO: 4 channels

676	866.9875 - ***
714	867.4875 - ***
752	867.9875 - ***
790	868.4875 - ***

676	866.9875 - ***
714	867.4875 - ***
752	867.9875 - ***
790	868.4875 - ***

CYA at lone

FB: 2 channels

756	868.0625
803	868.65

MO: 3 channels

756	868.0625
758	868.0875
803	868.65

CYA at Napa (Yountville)

FB: 1 channel

632	866.4125 - ***
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MO: 1 channel

632	866.4125 - ***
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Additional State of California Mobile Frequencies

MO: 10 channels

602	866.0375 - ***
636	866.4625 - ***
642	866.5625 - ***
678	867.0375 - ***
712	867.4625 - ***
718	867.5625 - ***
754	868.0375 - ***
788	868.4625 - ***
794	868.5375 - ***
796	868.5625 - ***

City of Campbell

FB: 1 channel

663	866.825
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City of Ceres

FB: 4 channels

606	866.0875 - ***
682	867.0875 - ***
750	867.9625 - ***
828	868.9625 - ***

County of Contra Costa

FB: 24 channels

610	866.1375 - Jail
627	866.35
628	866.3625
652	866.6875 - Jail
674	866.9625 - Data
709	867.425
710	867.4375
721	867.6
722	867.6125
734	867.7625
735	867.775
747	867.925
748	867.9375
761	868.125
762	868.1375
774	868.2875
775	868.3

797	868.575
798	868.5875
810	868.675 - Jail
811	868.7375
805	868.75
825	868.925
826	868.9375

712	867.4625
721	867.6
722	867.6125
734	867.7625
735	867.775
747	867.925
748	867.9375
761	868.125
762	868.1375
774	868.2875
775	868.3
797	868.575
798	868.5875
810	868.7375
811	868.75
825	868.925
826	868.9375

MO: 26 channels

627	866.35
628	866.3625
647	866.625
663	866.825
674	866.9625
681	867.075
695	867.25
709	867.425
710	867.4375

City of Davis

FB: 4 channels

697	867.275
726	867.6625
757	868.075
802	868.6375

MO: 1 channel

692	867.2125
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Elk Grove Unified School District

FB: 4 channels

653	866.7
693	867.225
741	867.85
817	868.825

City of Emeryville / City of Piedmont

FB: 1 channel

690	867.1875 - ***
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MO: 1 channel

690	867.1875 - ***
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City of Fresno

FB: 3 channels

611	866.15 - ***
633	866.425 - ***
661	866.8 - ***

Livermore Amador Valley Transit Authority

FB: 1 channel

683	867.1
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City of Lodi

FB: 1 channel

655	866.725
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City of Mountain View

FB: 1 channel

681	867.075
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State of Nevada

FB: 8 channels

614	866.1875 - ***
652	866.6875 - ***
680	867.0625 - ***
692	867.2125 - ***
707	867.4 - ***
726	867.6625 - ***
734	867.7625 - ***
756	868.0625 - ***

City of Oakland

FB: 17 channels

613	866.175
635	866.45
650	866.6625
654	866.7125
660	866.7875

684	867.1125
686	867.1375
698	867.2875
729	867.7
731	867.725
744	867.8875

765	868.175 - ***
767	868.2
778	868.3375
788	868.4625 - ***
807	868.7
818	868.8375

City of Palo Alto

FB: 1 channel

MO: 1 channel

750	867.9625
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750	867.9625
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City of Redwood City

FB: 1 channel

666	866.8625
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Regents of University of California

FB: 5 channels

MO: 5 channels

638	866.4875 - ***
676	866.9875 - ***
714	867.4875 - ***
752	867.9875 - ***
790	868.4875 - ***

638	866.4875 - ***
676	866.9875 - ***
714	867.4875 - ***
752	867.9875 - ***
790	868.4875 - ***

Additional channels at UC Berkeley

FB: 2 channels

MO: 2 channels

656	866.7375
694	867.2375

656	866.7375
694	867.2375

Additional channels at UC Davis

FB: 2 channels

605	866.075
770	868.2375

City of Richmond

FB: 8 channels

MO: 7 channels

648	866.6375
664	866.8375
688	867.1625
702	867.3375
725	867.65
756	868.0625
805	868.675
820	868.8625

648	866.6375
664	866.8375
688	867.1625
702	867.3375
725	867.65
756	868.0625
805	868.675

City of Roseville

FB: 10 channels

618	866.2375
643	866.575
667	866.875
679	867.05
685	867.125
705	867.375
739	867.825
755	868.05
779	868.35
795	868.55

City and County of Sacramento 49 Channels & Fire 2 Channels

FB: 51 channels

603	866.05 - ***
608	866.1125 - ***
612	866.1625
620	866.2625
625	866.325
630	866.3875
634	866.4375 - ***
636	866.4625
645	866.6
647	866.625
649	866.65
651	866.675 - ***
657	866.75 - ***
661	866.8
663	866.825
665	866.85
681	867.075
683	867.1 - ***
687	867.15
689	867.175
695	867.25
699	867.3
701	867.325
703	867.35 - ***
707	867.4
712	867.4625 - ***
719	867.575
724	867.6375
728	867.6875 - ***
730	867.7125
732	867.7375
737	867.8
743	867.875 - ***
745	867.9 - ***
750	867.9625
759	868.1
764	868.1625
766	868.1875 - ***
772	868.2625 - ***
777	868.325
785	868.425
787	868.45
800	868.6125
806	868.6875

808	868.7125
813	868.775
815	868.8
819	868.85
821	868.875
823	868.9 - ***
828	868.9625 - ***

MO: 58 channels

603	866.05 - ***
607	866.1
608	866.1125 - ***
612	866.1625
617	866.225
620	866.2625
625	866.325
630	866.3875
634	866.4375 - ***
636	866.4625
645	866.6
647	866.625
649	866.65
651	866.675 - ***
654	866.7125
657	866.75 - ***
661	866.8
663	866.825
665	866.85
668	866.8875
678	867.0375
681	867.075
683	867.1 - ***
687	867.15
689	867.175
695	867.25
699	867.3
701	867.325
703	867.35 - ***
707	867.4
712	867.4625 - ***
719	867.575
724	867.6375
728	867.6875 - ***
730	867.7125
732	867.7375
737	867.8

743	867.875 - ***
745	867.9 - ***
750	867.9625
759	868.1
764	868.1625
766	868.1875 - ***
772	868.2625 - ***
777	868.325
780	868.3625
785	868.425
787	868.45
796	868.5625
800	868.6125
806	868.6875
808	868.7125
813	868.775
815	868.8
819	868.85
821	868.875
823	868.9 - ***
828	868.9625 - ***

City of San Bruno

FB: 1 channel

652	866.6875
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City and County of San Francisco

FB: 28 channels

609	866.125
611	866.15
619	866.25 - ***
631	866.4
633	866.425
644	866.5875
646	866.6125
658	866.7625
662	866.8125
680	867.0625
682	867.0875
692	867.2125
696	867.2625
704	867.3625
706	867.3875
727	867.675
740	867.8375
742	867.8625
758	868.0875
769	868.225
771	868.25
784	868.4125
786	868.4375
801	868.625
803	868.65
814	868.7875 - ***
816	868.8125
822	868.8875

San Francisco Bay Area Rapid Transit

FB: 11 channels

602	866.0375
617	866.225
624	866.3125
642	866.5625
668	866.8875 - ***
678	867.0375
718	867.5625
738	867.8125
754	868.0375
780	868.3625
794	868.5375

MO: 11 channels

602	866.0375
617	866.225
624	866.3125
642	866.5625
668	866.8875 - ***
678	867.0375
718	867.5625
738	867.8125
754	868.0375
780	868.3625
794	868.5375

County of San Joaquin

FB: 1 channel

672	866.9375 - Data
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City of San Jose

FB: 3 channels

649	866.65
672	866.9375 - Data
821	868.875

City of Santa Clara

FB: 10 channels

620	866.2625
636	866.4625
645	866.6
699	867.3
703	867.35
728	867.6875
785	868.425
787	868.45
806	868.6875
815	868.8

MO: 14 channels

620	866.2625
636	866.4625
645	866.6
699	867.3
701	867.325
703	867.35
728	867.6875
730	867.7125
743	867.875
785	868.425
787	868.45
806	868.6875
815	868.8
819	868.85

County of Santa Clara

FB: 3 channels

687	867.15
726	867.6625
804	868.6625

MO: 3 channels

687	867.15
726	867.6625
804	868.6625

Santa Clara Valley Water District

FB: 1 channel

766	868.1875
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MO: 2 channels

766	868.1875
770	868.2375

City of Stockton

FB: 5 channels

667	866.875
685	867.125
705	867.375
739	867.825
779	868.35

MO: 5 channels

667	866.875
685	867.125
705	867.375
739	867.825
779	868.35

City of Sunnyvale

FB: 1 channel

647	866.625
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City of Turlock

FB: 6 channels

646	866.6125 - ***
664	866.8375 - ***
711	867.45 - ***
730	867.7125 - ***
771	868.25 - ***
801	868.625 - ***

MO: 6 channels

646	866.6125 - ***
664	866.8375 - ***
711	867.45 - ***
730	867.7125 - ***
771	868.25 - ***
801	868.625 - ***

City of Vacaville

FB: 6 channels

610	866.1375
632	866.4125
659	866.775
691	867.2
768	868.2125
804	868.6625

MO: 6 channels

610	866.1375
632	866.4125
659	866.775
691	867.2
768	868.2125
804	868.6625

City of Walnut Creek

FB: 1 channel

700	867.3125
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MO: 1 channel

700	867.3125
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602		622	Red Cross	640		660		678		698		716		736		754		774		794		814	
603		623		641		661	Fresno	679	Roseville	699	Santa Clara City	717		737		755	Roseville	775		795	Roseville	815	Santa Clara City
604	Belmont	624		642		662		680	Nevada	700	Walnut Creek	718		738		756	Richmond, CYA at Lone, Nevada	776		796		816	
605	UC Davis	625		643	Roseville	663	Campbell	681	Mountain View	701		719		739	Roseville, Stockton	757	Davis	777		797		817	Elk Grove
606	Ceres	626		644		664	Richmond, Turlock	682	Ceres	702	Richmond	720		740		758		778		798		818	
607		627		645	Santa Clara City	665		683	Livermore Amador Transit	703	Santa Clara City	721		741	Elk Grove	759		779	Roseville, Stockton	799		819	
608		628		646	Turlock	666	Redwood City	684		704		722		742		760		780		800		820	Richmond
609		629		647	Sunnyvale	667	Roseville, Stockton	685	Roseville, Stockton	705	Roseville, Stockton	723		743		761		781		801	Turlock	821	San Jose
610	CoCo Prison, Vacaville	630		648	Richmond	668		686		706		724		744		762		782		802	Davis	822	
611	Fresno	631		649	San Jose	669		687	Santa Clara County	707	Nevada	725	Richmond	745		763		783		803	CYA at Lone	823	
612		632	Vacaville, CYA at Napa	650		670		688	Richmond	708		726	Davis, Santa Clara County, Nevada	746		764		784		804	Santa Clara County, Vacaville	824	
613		633	Fresno	651		671		689		709		727		747		765		785	Santa Clara City	805	Richmond, CoCo Prison	825	
614	Nevada	634		652	Co Co Prison, San Bruno, Nevada	672	San Joaquin data, ***San Jose Data***	690	Emeryville / Piedmont	710		728	***Santa Clara City***	748		766	Santa Clara Water	786		806	Santa Clara City	826	
615		635		653	Elk Grove	673		691	Vacaville	711	Turlock	729		749		767		787	Santa Clara City	807		827	
616		636	***Santa Clara City***	654		674	Contra Costa data	692	Nevada	712		730	Turlock	750	Palo Alto, Ceres	768	Vacaville	788		808		828	Ceres
617		637		655	Lodi	675		693	Elk Grove	713		731		751		769		789		809		829	
618	Roseville	638		656	UC Berkeley	676	CYA at Stockton	694	UC Berkeley	714	CYA at Stockton	732		752	CYA at Stockton	770	UC Davis	790	CYA at Stockton	810		830	
619		638G		657		676G		695		714G		733		752G		771	Turlock	791		811			
601		620	Santa Clara City	639		658		696		715		734	Nevada	753		772		792		812			
601G		621		639G		659	Vacaville	677G		697	Davis	715G		735		753G		773		793			

Legend	
	San Francisco
	Alameda
	Contra Costa (EBRCS)
	Oakland
	Sacramento
	Regents of UC
	Guard Channel
	Misc. or Not Used
	BART
	Mutual Aid
	***Bold Blue Text***
	Additional channel not in previous plan

Co/Adj Channel List of All Agencies in New Repacking Plan

	Co-channel	Adj-channel
ALAMEDA	Turlock	Ceres Contra Costa (EBRCS) Nevada Palo Alto Roseville Sacramento
RED CROSS	N/A	N/A
BELMONT	N/A	Sacramento UC Med Center at Sac and Davis
CYA AT IONE	Nevada Richmond San Francisco	Davis Roseville Santa Clara County Vacaville
CYA AT NAPA	Vacaville	Fresno San Francisco
CYA AT STOCKTON	Regents of UC	N/A
CAMPBELL	Sacramento	Richmond San Francisco Turlock
CERES	Palo Alto San Francisco	Alameda County Livermore Amador Transit Mountain View Sacramento UC Med Center at Sac and Davis
CONTRA COSTA	Nevada	Alameda County Turlock
CONTRA COSTA DATA	N/A	N/A
CONTRA COSTA JAIL	Nevada Richmond San Bruno Vacaville	Elk Grove School District Fresno Sacramento San Francisco Santa Clara City Santa Clara County Vacaville
DAVIS	Nevada Santa Clara County	CYA at Ione Nevada Oakland Richmond San Francisco Turlock
ELK GROVE SCHOOL DISTRICT	N/A	Contra Costa Jail Nevada Oakland San Bruno San Francisco UC Berkeley
EMERYVILLE / PIEDMONT	N/A	Sacramento Vacaville
FRESNO	Sacramento	Contra Costa Jail

	San Francisco	CYA at Napa Oakland Sacramento San Francisco Vacaville
LIVERMORE AMADOR TRANSIT	Sacramento	Ceres Oakland San Francisco
LODI	N/A	Oakland UC Berkeley
MOUNTAIN VIEW	Sacramento	Ceres Nevada San Francisco
NEVADA	Contra Costa (EBRCS) Contra Costa Jail CYA at Lone Davis Richmond Sacramento San Bruno San Francisco Santa Clara County	Alameda County Contra Costa (EBRCS) Davis Elk Grove School District Mountain View Oakland Richmond Roseville Sacramento San Francisco Vacaville
OAKLAND	N/A	Davis Elk Grove School District Fresno Livermore Amador Transit Lodi Nevada Roseville Sacramento San Jose Santa Clara City Santa Clara County Santa Clara Water Stockton Turlock Vacaville
PALO ALTO	Ceres Sacramento	Alameda County
REDWOOD CITY	N/A	Roseville Sacramento Stockton
RICHMOND	Contra Costa Jail CYA at Lone Nevada Turlock	Campbell Davis Nevada Roseville Sacramento San Jose Santa Clara City Santa Clara County Sunnyvale Vacaville

ROSEVILLE	Stockton	Alameda County CYA at Lone Nevada Oakland Redwood City Richmond San Francisco San Francisco Bay Area Rapid Transit
SACRAMENTO	Campbell Ceres Fresno Livermore Amador Transit Mountain View Nevada Palo Alto San Jose Santa Clara City Santa Clara County Santa Clara Water Sunnyvale Turlock	Alameda County Belmont Ceres Contra Costa Jail Emeryville / Piedmont Fresno Nevada Oakland Redwood City Richmond San Francisco San Francisco Bay Area Rapid Transit Turlock UC Berkeley Walnut Creek
SAN FRANCISCO BAY AREA RAPID TRANSIT	N/A	Roseville Sacramento Stockton
SAN BRUNO	Contra Costa Jail Nevada	Elk Grove School District Sacramento
SAN FRANCISCO	Ceres CYA at Lone Fresno Nevada Turlock	Campbell Contra Costa Jail CYA at Napa Davis Elk Grove School District Fresno Livermore Amador Transit Mountain View Nevada Roseville Sacramento San Jose Santa Clara City Santa Clara County Stockton Sunnyvale UC Davis Vacaville
SAN JOAQUIN DATA	San Jose Data	
SAN JOSE	Sacramento	Oakland Richmond San Francisco
SAN JOSE DATA	San Joaquin Data	
SANTA CLARA WATER	Sacramento	Oakland
SANTA CLARA CITY	Sacramento	Contra Costa Jail

		Oakland Richmond San Francisco Turlock Walnut Creek
SANTA CLARA COUNTY	Davis Nevada Sacramento Vacaville	Contra Costa Jail CYA at Lone Oakland Richmond San Francisco
STOCKTON	Roseville	Oakland Redwood City San Francisco San Francisco Bay Area Rapid Transit
SUNNYVALE	Sacramento	Richmond San Francisco Turlock
TURLOCK	Alameda County Richmond Sacramento San Francisco	Campbell Contra Costa (EBRCS) Davis Oakland Sacramento Santa Clara City Sunnyvale UC Davis
UC BERKELEY	N/A	Elk Grove School District Lodi Sacramento
UC DAVIS	N/A	Belmont Ceres San Francisco Turlock
VACAVILLE	Contra Costa Jail CYA at Napa Santa Clara County	Contra Costa Jail CYA at Lone Fresno Richmond San Francisco
WALNUT CREEK	N/A	Sacramento Santa Clara City

602		622	Red Cross	640		660	Roseville	678	Vacaville	698	Vacaville	716		736	Roseville	754		774		794		814	
603		623		641		661	Fresno	679		699		717		737	Richmond	755		775		795		815	
604		624	Vacaville	642		662	Contra Costa	680	Nevada	700		718	Vacaville	738	Contra Costa	756	Roseville, Nevada	776	Elk Grove Sch Dist	796	Stockton	816	
605		625	Stockton	643		663		681	City of Santa Clara, City of Davis	701	San Bruno, Lodi	719	Stockton	739		757		777	Livermore / Amador Transit	797		817	
606	Ceres	626	Walnut Creek	644		664	City of Santa Clara, Turlock	682	Ceres	702	City of Santa Clara	720	City of Davis	740		758		778		798		818	
607	Richmond	627	Redwood City	645		665		683	Richmond	703		721	San Joaquin	741		759	Richmond	779		799	UC Davis, San Jose	819	Elk Grove Sch Dist, Belmont
608	Santa Clara County	628		646	Turlock, City of Davis	666	Elk Grove Sch. Dist.	684	Santa Clara County	704	Santa Clara County, CYA at lone	722		742	City of Santa Clara	760		780		800	Richmond	820	UC Berkeley
609		629		647		667		685		705	Sacramento	723	Richmond	743	Contra Costa Prison, Richmond	761		781		801	City of Santa Clara, Turlock	821	Contra Costa, Roseville
610		630	Santa Clara Water	648		668		686		706	Roseville	724	San Jose	744	Sunnyvale	762		782		802		822	City of Santa Clara
611	Fresno	631		649		669		687		707	Nevada	725		745		763		783		803		823	
612	Elk Grove Sch Dist.	632	CYA at Napa, Contra Costa	650	Contra Costa Prison	670		688	Contra Costa	708	Contra Costa	726	Roseville, Nevada	746		764	Vacaville	784	Contra Costa	804		824	
613	UC Berkeley	633	Fresno, (Hi Level)	651		671		689		709		727		747		765	Stockton	785		805		825	
614	Nevada	634		652	Vacaville, Nevada	672		690	Sac Fire District, Emeryville / Piedmont, Contra	710	Mountain View	728		748		766	Contra Costa	786		806	Roseville	826	
615		635		653	Stockton	673		691		711	Turlock	729		749		767		787		807		827	
616		636	Sacramento Fire District, City of Santa Clara	654		674		692	Nevada	712		730	UC Davis, Turlock	750	Ceres, Roseville	768	City of Davis	788	Roseville	808		828	Ceres
617		637		655		675		693		713		731		751		769		789		809		829	
618		638		656		676	CYA at Stockton	694	Roseville	714	CYA at Stockton	732		752	CYA at Stockton	770	Palo Alto	790	CYA at Stockton	810		830	
619		638G		657	Richmond	676G		695		714G		733		752G		771	Turlock	791		811			
601		620	City of Santa Clara	639		658	Campbell, CYA at lone	677		696		715		734	Nevada	753		772		792		812	
601G		621		639G		659		677G		697		715G		735		753G		773		793		813	

Legend	
	San Francisco
	Alameda
	Oakland
	Sacramento
	San Francisco / Sacramento
	Sacramento / Oakland
	Regents of UC
	Guard Channel
	Misc. or Not Used
	BART
	Mutual Aid

Co/Adj Channel List of All Agencies in Existing Plan

	Co-channel	Adj-channel
ALAMEDA	Fresno Nevada	Contra Costa CYA at Napa Davis Elk Grove School District Nevada Palo Alto Richmond Roseville Sacramento
RED CROSS	N/A	N/A
BELMONT	Elk Grove School District	UC Berkeley
CYA AT IONE	Campbell Santa Clara County	Richmond Sacramento San Francisco San Francisco Bay Area Rapid Transit
CYA AT NAPA	Contra Costa	Alameda Fresno Oakland Sacramento
CYA AT STOCKTON	Regents of UC	N/A
CAMPBELL	CYA at Ione	Richmond Sacramento San Francisco
CERES	Roseville San Francisco Bay Area Rapid Transit	Davis Oakland Richmond Sacramento Santa Clara City San Francisco Bay Area Rapid Transit
CONTRA COSTA	CYA at Napa Roseville	Alameda County Fresno Nevada Oakland Richmond Sacramento San Francisco San Francisco Bay Area Rapid Transit Santa Clara City Stockton UC Berkeley
CONTRA COSTA DATA	N/A	N/A
CONTRA COSTA JAIL	Emeryville / Piedmont Richmond Sacramento	Sacramento San Francisco Santa Clara City Sunnyvale
DAVIS	Santa Clara City Turlock	Alameda County Ceres Nevada Oakland

		San Francisco Bay Area Rapid Transit San Joaquin Data Stockton
ELK GROVE SCHOOL DISTRICT	Belmont Oakland San Francisco	Alameda County Fresno Livermore Amador Transit UC Berkeley
EMERYVILLE / PIEDMONT	Sacramento	N/A
FRESNO	Alameda County	Contra Costa CYA at Napa Elk Grove School District Roseville Sacramento
LIVERMORE AMADOR TRANSIT	N/A	Elk Grove School District Oakland Sacramento San Francisco
LODI	San Bruno	Sacramento Santa Clara City
MOUNTAIN VIEW	Sacramento San Francisco	Turlock
NEVADA	Alameda County Roseville San Francisco Vacaville	Alameda County Contra Costa Davis Oakland Roseville Sacramento San Francisco San Francisco Bay Area Rapid Transit Santa Clara City Stockton UC Berkeley
OAKLAND	Ceres Elk Grove School District Nevada Roseville Sacramento Stockton Vacaville	Contra Costa CYA at Napa Davis Livermore Amador Transit Nevada Sacramento San Jose Santa Clara County Santa Clara Water Stockton Turlock UC Davis Vacaville Walnut Creek
PALO ALTO	Sacramento	Alameda County Turlock
REDWOOD CITY	Sacramento	Walnut Creek
RICHMOND	Contra Costa Jail Sacramento San Francisco Bay Area Rapid Transit	Alameda County Campbell Ceres Contra Costa

		CYA at lone Roseville Sacramento San Francisco San Jose Santa Clara City Santa Clara County Sunnyvale Turlock UC Davis
ROSEVILLE	Ceres Contra Costa Nevada Oakland San Francisco San Francisco Bay Area Rapid Transit	Alameda County Fresno Nevada Richmond Sacramento San Francisco San Francisco Bay Area Rapid Transit Santa Clara City UC Berkeley
SACRAMENTO	Ceres Contra Costa Contra Costa Jail Emeryville / Piedmont Mountain View Oakland Palo Alto Redwood City Richmond San Francisco San Francisco Bay Area Rapid Transit Santa Clara City Santa Clara County Turlock	Alameda County Campbell Ceres Contra Costa Contra Costa Jail CYA at lone CYA at Napa Fresno Livermore Amador Transit Lodi Nevada Oakland Richmond Roseville San Bruno San Francisco San Francisco Bay Area Rapid Transit San Jose Santa Clara City Santa Clara County Santa Clara Water Stockton Sunnyvale Turlock Walnut Creek Vacaville
SAN FRANCISCO BAY AREA RAPID TRANSIT	Ceres Richmond Roseville Sacramento San Joaquin Data	Ceres Contra Costa CYA at lone Davis Nevada Roseville Sacramento Santa Clara City Santa Clara County Vacaville

SAN BRUNO	Lodi	Sacramento Santa Clara City
SAN FRANCISCO	Elk Grove School District Mountain View Sacramento	Campbell Contra Costa Contra Costa Jail CYA at Lone Livermore Amador Transit Nevada Richmond Roseville San Jose Santa Clara City Santa Clara County Sunnyvale Turlock UC Davis Vacaville
SAN JOAQUIN DATA	San Francisco Bay Area Rapid Transit	Davis
SAN JOSE	UC Davis	Oakland Richmond Sacramento San Francisco
SAN JOSE DATA	N/A	N/A
SANTA CLARA WATER	N/A	Oakland Sacramento
SANTA CLARA CITY	Davis Sacramento Turlock	Ceres Contra Costa Jail Lodi Nevada Richmond Sacramento San Bruno San Francisco San Francisco Bay Area Rapid Transit Turlock
SANTA CLARA COUNTY	CYA at Lone Sacramento	Oakland Richmond Sacramento San Francisco San Francisco Bay Area Rapid Transit
STOCKTON	Oakland	Contra Costa Nevada Sacramento Vacaville Walnut Creek
SUNNYVALE	N/A	Contra Costa Jail Richmond Sacramento San Francisco
TURLOCK	Sacramento Santa Clara City UC Davis	Mountain View Oakland Palo Alto Richmond

		Sacramento San Francisco
UC BERKELEY	N/A	Belmont Contra Costa Elk Grove School District Nevada Roseville
UC DAVIS	San Jose Turlock	Oakland Richmond San Francisco
VACAVILLE	Nevada	Oakland Sacramento San Francisco San Francisco Bay Area Rapid Transit Stockton
WALNUT CREEK	N/A	Oakland Redwood City Sacramento Stockton