

**Alaska Land Mobile Radio  
TDMA Transition Briefing  
April 13, 2022**

Background

In the July 2020 ALMR newsletter, agencies were notified that Phase 2 capability was going to be required on all new radios on ALMR. In January 2021, a requirement was formally put in place that any radios added to the system from that point forward were required to have the TDMA Phase 2 capability, while existing radios on the system could continue to operate until a date was set to complete the transition.

The ALMR system is currently undergoing an upgrade to the next Motorola software release which operates the core network in each of the three ALMR Zones. This work started last year with the replacement of the Quantar repeaters at each site with replacement GTR8000 repeaters, with six sites remaining to be completed in 2022. It is expected that this fall the core system upgrade will occur, followed by the turn up of TDMA Phase 2.

As the upgrade to the system and TDMA continues, discussions surrounding the transition continue to occur on an almost daily basis. Currently, the upgrade is in progress with work scheduled throughout 2022 and likely into early to mid 2023. We do not have any TDMA sites currently on the system, as there are a number of upgrades (hardware and software) needed related to the master sites and backhaul transport.

TDMA Transition

TDMA, an acronym that stands for Time Division Multiple Access, refers to a method for utilizing the available radio spectrum in the ALMR system. Currently the system uses FDMA, or Frequency Division Multiple Access. Replacement of the Quantar repeaters was a prerequisite to utilizing TDMA as is the core software upgrade and an upgrade to the network equipment, which provides backhaul between the RF and master sites.

TDMA, in concert with other features that were purchased as part of the upgrade, will begin to allow for newer features and more efficient use of the system in the years to come. TDMA primarily allows for a doubling of the system capacity because it uses the radio spectrum in a more efficient way than FDMA. As an example, let's look at the Glenallen site which has four total channels. One of those channels is a control channel for the system, leaving three voice channels. Under FMDA, those three channels can handle three transmissions at the same time. TDMA splits the voice channels, doubling the capacity to six channels simultaneously. This will allow access for more users at each site and should significantly reduce the number of system busies at sites with fewer voice channels.

## USE CASE: INCREASED VOICE CAPACITY WITH TDMA



### TDMA Analysis

There are a number of benefits and some potential drawbacks to a TDMA system. The primary benefit is the increase in capacity without having to increase physical hardware and frequency usage at each site. In addition, the re-engineering of TDMA has resulted in increased gain antennas being used, and in some sites, a dual-diversity antenna installation in order to provide for increased in-building coverage.

These improvements are designed to complement a reduced power output at each site. This reduced power, as currently engineered by Motorola, is not expected to decrease coverage. However there has not been any field testing as the feature is not yet available in the system.

The updated TDMA system has the ability to function in either FDMA or TDMA mode, which will allow for a transitional period for member agency subscriber units. It is important to note that the presence of any FDMA radio affiliated with a site will cause an entire channel to use FDMA. That mode will eliminate a significant benefit to the TDMA transition, essentially taking up an additional voice channel when it is not necessary.

### Timeline

Preliminary timeline as of April 2022. This timeline is subject to revision based on upgrade schedule and other external factors.

2021	GTR upgrade of RF sites (6 remaining)
1 <sup>st</sup> quarter 2022	Atwood site re-engineering
April/May 2022	Southeast sites GTR upgrades begin (Haines, High Mtn, Saddle Mtn, Skagway, Sunny Hay)
	In-person system audit conducted

May – August 2022	Off-site upgrade preplanning
2 <sup>nd</sup> – 3 <sup>rd</sup> quarter 2022	DOD-owned sites upgraded (GTR and microwave)
September 2022	On-site core system software upgrade
December 2022	TDMA turned up
December 2023	User agencies replace FDMA subscriber units (1/3)
December 2024	User agencies replace FDMA subscriber units (1/3)
December 2025	User agencies replaced FDMA subscriber units (1/3)
December 31, 2026	Target date for TDMA only subscriber units

Pre-requisite tasks

Tasks (in no particular order)

GTR Replacement  
System Audit  
Core software upgrade  
Juniper router/backhaul upgrade  
FCC licensing updates  
NTIA licensing updates/DOD sharing agreement  
MOA licensing updates  
Band Plan Finalization  
Radio Reprogramming for TDMA  
Flash upgrades for TDMA

Responsibility

Motorola Solutions  
Motorola Solutions  
Motorola Solutions  
Motorola/APSCS  
APSCS  
DOD/OMO  
Muni  
Motorola Solutions  
Member Agencies  
Member Agencies

Outreach plan

1. TDMA transition reminders/updates will be published in quarterly newsletters.
2. OMO will assist agencies with grant funding and other sources of funding to replace End of Life radios and will encourage agencies to adopt a continuous maintenance/replacement cycle going forward.
3. Upon approval of the policy, a “town hall” live discussion will be moderated by the OMO regarding TDMA, the transition, and any other items of interest. This may become a recurring event.
4. Agency POCs will be sent periodic reminders via e-mail of the transition.
5. During the annual inventory confirmation process, agencies will be requested to physically verify their inventory and encouraged to remove any FDMA radios that are no longer in use to ensure an accurate listing in the system.

6. Annually in 2023, 2024, and 2025, the OMO will send individual agencies a listing of radios that are suspected to be non-TDMA, based on their serial number, to bring individual attention to those specific units.
7. The OMO will advise individual member agencies who are due to receive flash upgrades for existing radio units and provide a detailed list by serial number

### OMO Commentary

The transition to TDMA is a tremendous commitment on the part of the SOA, DOD, and the Municipality of Anchorage in addition to all member agencies. Adoption of this technology and the current system upgrade will pave the way for enhancements and future growth of the system. There are certainly potential drawbacks and unknowns that are a result of our inability to currently field test the technology, these assurances are based on Motorola engineers and the successful implementation of the technology in other systems.

The responsibility for our member agencies to transition their radio equipment is the largest expense to individual agencies. There are many FDMA radios currently operating on the system by many different agencies. The current budget situation, political considerations, and the ability for individual agencies to accommodate these capital purchases make this a significant burden for some members. Additionally, inflation at a national level, supply chain issues, travel restrictions, and many other factors are at play that are outside any agencies ability to control.

It should be noted that the OMO and SMO have been working with agencies for about eighteen months on this transition, and it has been announced and discussed in nearly every newsletter and meeting as well as on our website during that time. A majority of these subscriber units that require replacement as a result of the transition have been without support or replacement parts for many years and may no longer be appropriate for public safety related operations. This upgrade is a prime opportunity to work with all agencies to refresh their current equipment inventory to supported radios.

Due to these factors, I recommend that we take advantage of the benefits brought about by TDMA and encourage all agencies to refresh the radios as soon as feasible. At the same time, I would encourage the user council to maintain flexibility with any approved policy and note that we may have to revisit the issue in the future and potentially extend the timeline based on the progress of our agencies. In concert with the User Council decision, I recommend we target the goal of having all radios transitioned by December 31, 2026. This will allow us to receive value for the funds spent on the upgrade, allow for the use of expanding technologies, and give several budget cycles for each individual agency to allocate or apply for funding and execute the required steps for their new TDMA subscriber units.

### Adopted Policy by the User Council

The ALMR User Council directed the OMO and SMO to proceed with the transition of TDMA for the ALMR system. This transition will result in a responsibility for all member agencies to transition to TDMA Phase 2 compatible subscriber units. No non-TDMA compliant radios are able to be added to the system as announced in January 2021.

All agencies will take immediate steps to plan for the replacement of any non-TDMA radios, which may no longer be supported by the manufacturer. It is the goal of the user council that all non-TDMA radios to be replaced by member agencies by December 31, 2026. Further, it is the intent of the user council to not remove FDMA radios that may still be in use on that date.