Section 3: The Network for Messages

Objectives

Welcome to Topic 15.

This Learning Topic is designed to offer a basic understanding of NTS and its function during an emergency. After you have completed the topic, you will understand how messages are passed from one location to another, and which nets are involved. You will also know how the NTS is designed to facilitate the timely and orderly flow of messages.

Student Preparation required:

None.

What is the NTS?

The National Traffic System (NTS) is a unique arrangement for handling messages that was designed over 50 years ago. Organized traffic handling was a central purpose of ARRL at its founding in 1914! Its goal is to enable a message to be passed across the continent within 24 hours. NTS does this with a group of specialized nets operating in a "cycle" that allows messages to move smoothly from a local net, to a regional net, to various transcontinental nets, and then back down to regional and local nets at the destination. Ultimately, someone in a local net near the addressee should be able to deliver the message by phone, in person, by mail, or email and even amateur radio. Many NTS messages reach their address by radio, and it should be included as a viable delivery resource.

One of the most important features of the NTS is the "system concept." No NTS net is an independent entity; it interfaces with other NTS nets. Each net performs a specific function in the overall organization. To the extent a net fails to perform any of its functions, it can affect the performance of the overall system. (A net whose exclusive purpose is to pass messages between

its own stations would not be considered part of NTS.)

In the days before inexpensive long-distance telephone, and well before the Internet and email, the NTS was used heavily for routine daily communication between Amateur Radio operators, family, and friends. This daily traffic kept NTS members in practice for handling large volumes of traffic during emergencies and disasters, the ultimate reason for the NTS's existence. Today, routine daily traffic on the NTS is light, and large-scale emergency operations are generally during major disasters with widespread infrastructure damage. However, this does not lessen the importance of the NTS in assisting our served agencies. One of the most important duties of NTS and its benefits to served agencies is "health and welfare" traffic as we will discuss. However use of NTS is dependent to a large degree upon the Partners and their traffic requirements. It is wise to note that not all served agencies will elect to use the NTS system, opting instead to use their own forms, such as during an incident where an ICS-213 form may be required. We must remember the principal that we serve at their pleasure and must employ the format which they direct us to use.

The NTS is not part of ARES, but is a separate and distinct ARRL program. The NTS and ARES work together. Think of the NTS as a "long distance carrier," and of ARES as the "local exchange carrier." This analogy is not perfect, but it is close.

The NTS is not intended as competition for the many independently organized traffic networks. When necessitated by overload or lack of outlet for traffic, the facilities of independent networks can function as alternate traffic routings where this is indicated in the best interest of efficient message relay and/or delivery.

Nets may sometimes find it necessary and expedient to adopt temporary measures to ensure the movement of traffic. This is considered improper operation only when no attempt is made to return to the normal schedule. Nevertheless, improper operation of any NTS net is the concern of all NTS nets, and every effort should be made to assist in returning any non-functioning or improperly functioning net to its normal operation.

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How the NTS Works

The National Traffic System consists of four different levels of nets. These operate in an orderly time sequence to move messages in a definite pattern from origin to destination. A message flows through the NTS in a manner similar to a business-person who travels between two small rural towns at opposite ends of the country. This person has to change carriers many times in the process, starting with a drive to the local airport, then a feeder airline to a major airport, to a transcontinental airline, to another feeder airline, and finally by ground again to the destination.

In a very similar manner, the transcontinental message starts with the originating station in a local net, is carried up to the "Section" net, then up to the "Region" net, then up to the "Area" net, across to another "Area" net, and then back down the line to the point of delivery.

Of course, the message, like the passenger, can "get on" or "get off" at any point if that is the origin or destination. Thus, a message from San Francisco to Los Angeles would not go beyond Region level, and one from Syracuse to Buffalo would remain in the Section net(s). At the local level, messages may be passed into or out of local ARES or other nets for delivery to served agencies, or may be delivered to private citizens directly.

NTS nets may use FM, SSB, CW, and IRLP and VoIP (Voice over Internet Protocol). Messages may also be passed through NTS-affiliated local and Section traffic nodes that employ digital modes such as AMTOR, packet, D-Star, Winlink, PSK-31 and other such new technology modes with store-and-forward capabilities and bulletin-board operations. Long hauls can be made by the NTS digital stations on HF that interface with Section traffic nodes and the traditional nets of the system.

Local Nets

"Local" NTS nets are those that cover small areas such as a town, city, county or metropolitan area, but not a complete ARRL Section. They usually operate on two-meter or 70cm bands at times and on days most convenient to their members. Other nets are designated as "emergency" (ARES) nets that do not specialize in routine traffic handling. These nets generally become active only for training and during emergencies.

Local nets are intended mainly for local delivery of traffic, with a goal of delivery by non-toll telephone calls. They provide outlets for locally originated traffic, and route the incoming traffic as close as possible to its actual destination before delivery.

A local net, or "node", may also be conducted on a local packet system, where messages may be stored, forwarded, and picked up by local operators for subsequent delivery. A Net (Node) Manager is appointed by the Section Traffic Manager to manage these functions, and assure that traffic is moved expeditiously.

Section Nets

The purpose of the "Section" net is to handle messages within the Section, and to handle messages moving to and from the "Region" nets.

Either liaison stations from local NTS nets and nodes, individual stations, or both, handle messages passing within the Region. In most areas, all stations in the Section are invited to take part. However, in a highly populated Section with several metropolitan areas covered by local nets, representation may be by liaison stations, plus individual stations in cities or towns not covered by local nets.

The Section may have more than one net (e.g. a CW net, a VHF net, an SSB net, or a Section packet BBS). In an area with low population density or NTS activity, two or more Sections may combine to form a single net operating at Section level. Section nets are administered through the office of the Section Manager, with authority for this function often delegated to an appointed Section Traffic Manager and/or designated Net Managers. In the case of combined-Section nets, officials of the Sections concerned should collaborate on the designation of a qualified Amateur to manage the net.

Region Nets

"Region" nets cover a wider area, such as a call area. At this level, the object is representation of each ARRL Section within the Region. Participants normally include:

- A Net Control Station, designated by the Region net manager.

- Representatives from each of the various Sections in the Region, designated by their Section Net Managers.

- One or more stations designated by the Region net manager to handle traffic going to points outside the Region.

- One or more stations bringing traffic down from higher-level NTS nets.

- Any other station with traffic.

There may be more than one representative from each Section in the Region net, but more than two are usually superfluous and will only clutter the net. However, all Section representatives are required to represent the entire Section, not just their own net.

The purpose of the Region net is to exchange traffic between the Sections in the Region, put out-of-Region traffic in the hands of liaison stations, and distribute traffic coming into the Region among the Section net representatives. Regional nets are administered by managers elected by the NTS volunteers and supported through the Membership and Volunteer Programs Department (MVP) at ARRL Headquarters.

Area Nets

At the top level of NTS nets is the "Area" net. Participation at the area level includes:

- A Net Control Station, designated by the Area Net Manager.

- One or more representatives from each Region net in the Area, designated by the Region Net Managers.

- Transcontinental Corps (TCC) stations designated to handle traffic going to other Area nets.

- TCC stations designated to bring traffic from other Area nets.

- Any station with traffic.

There are three Areas, designated "Eastern," "Central" and "Pacific," the names roughly indicating their coverage of the US and Canada except that the Pacific Area includes the Mountain as well as the Pacific time zones. Area nets are administered by managers elected by the NTS volunteers and supported through the Membership and Volunteer Programs Department (MVP) at ARRL Headquarters.

For a map of NTS areas and regions, see below:

National Traffic System Area and Region map.
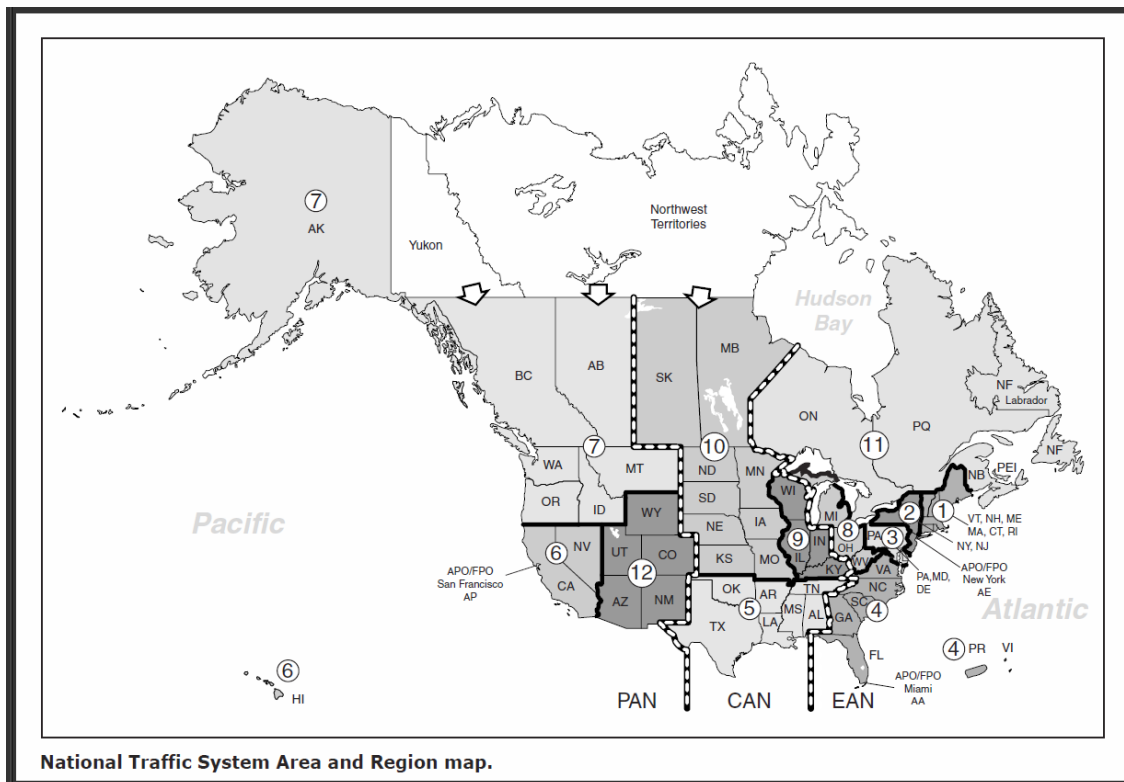
Map key: **National Traffic System Routing Guide**

State/Province	Abbrev.	Region	Area
Alaska	AK	7	PAN
Alabama	AL	5	CAN
Alberta	AB	7	PAN
Arizona	AZ	12	PAN
Arkansas	AR	5	CAN
British Columbia	BC	7	PAN

California	CA	6	PAN
Colorado	CO	12	PAN
Connecticut	CT	1	EAN
Delaware	DE	3	EAN
Dist. of Columbia	DC	3	EAN
Florida	FL	4	EAN
Georgia	GA	4	EAN
Guam	GU	6	PAN
Hawaii	HI	6	PAN
Idaho	ID	7	PAN
Illinois	IL	9	CAN
Indiana	IN	9	CAN
Iowa	IA	10	CAN
Kansas	KS	10	CAN
Kentucky	KY	9	CAN
Labrador	LB	11	EAN
Louisiana	LA	5	CAN
Maine	ME	1	EAN
Manitoba	MB	10	CAN
Maryland	MD	3	EAN
Massachusetts	MA	1	EAN
Michigan	MI	8	EAN
Minnesota	MN	10	CAN
Mississippi	MS	5	CAN
Missouri	MO	10	CAN
Montana	MT	7	PAN
Nebraska	NE	10	CAN
Nevada	NV	6	PAN
New Brunswick	NB	11	EAN
New Hampshire	NH	1	EAN
New Jersey	NJ	2	EAN
New Mexico	NM	12	PAN
New York	NY	2	EAN
Newfoundland	NF	11	EAN
North Carolina	NC	4	EAN
North Dakota	ND	10	CAN
Nova Scotia	NS	11	EAN
Ohio	OH	8	EAN
Oklahoma	OK	5	CAN
Ontario	ON	11	EAN
Oregon	OR	7	PAN
Pennsylvania	PA	3	EAN
Prince Edward Is.	PEI	11	EAN
Puerto Rico	PR	4	EAN
Quebec	PQ	11	EAN
Rhode Island	RI	1	EAN
Saskatchewan	SK	10	CAN
South Carolina	SC	4	EAN
South Dakota	SD	10	CAN
Tennessee	TN	5	CAN
Texas	TX	5	CAN

Utah	UT	12	PAN
Vermont	VT	1	EAN
Virginia	VA	4	EAN
Virgin Islands	VI	4	EAN
Washington	WA	7	PAN
West Virginia	WV	8	EAN
Wisconsin	WI	9	CAN
Wyoming	WY	12	PAN
APO New York APO	NY	2	EAN
APO San Francisco APO	SF	6	PAN

Transcontinental Corps

The handling of higher priority messages between "Area Nets" is accomplished through the facilities of the Transcontinental Corps (TCC). TCC members handle "routine" messages only in times of extreme overload. This is not a net, but a group of designated liaison stations that have the responsibility for seeing that inter-Area traffic reaches its destination Area. TCC is administered by TCC directors, or as delegated to the Area Digital Coordinator, in each Area who assign stations to report into Area nets for the purpose of "clearing" inter-Area traffic, and to keep out-of-net schedules with each other for the purpose of transferring traffic from one Area to another.

Fig 5-3 —National Traffic System flow chart. See text.
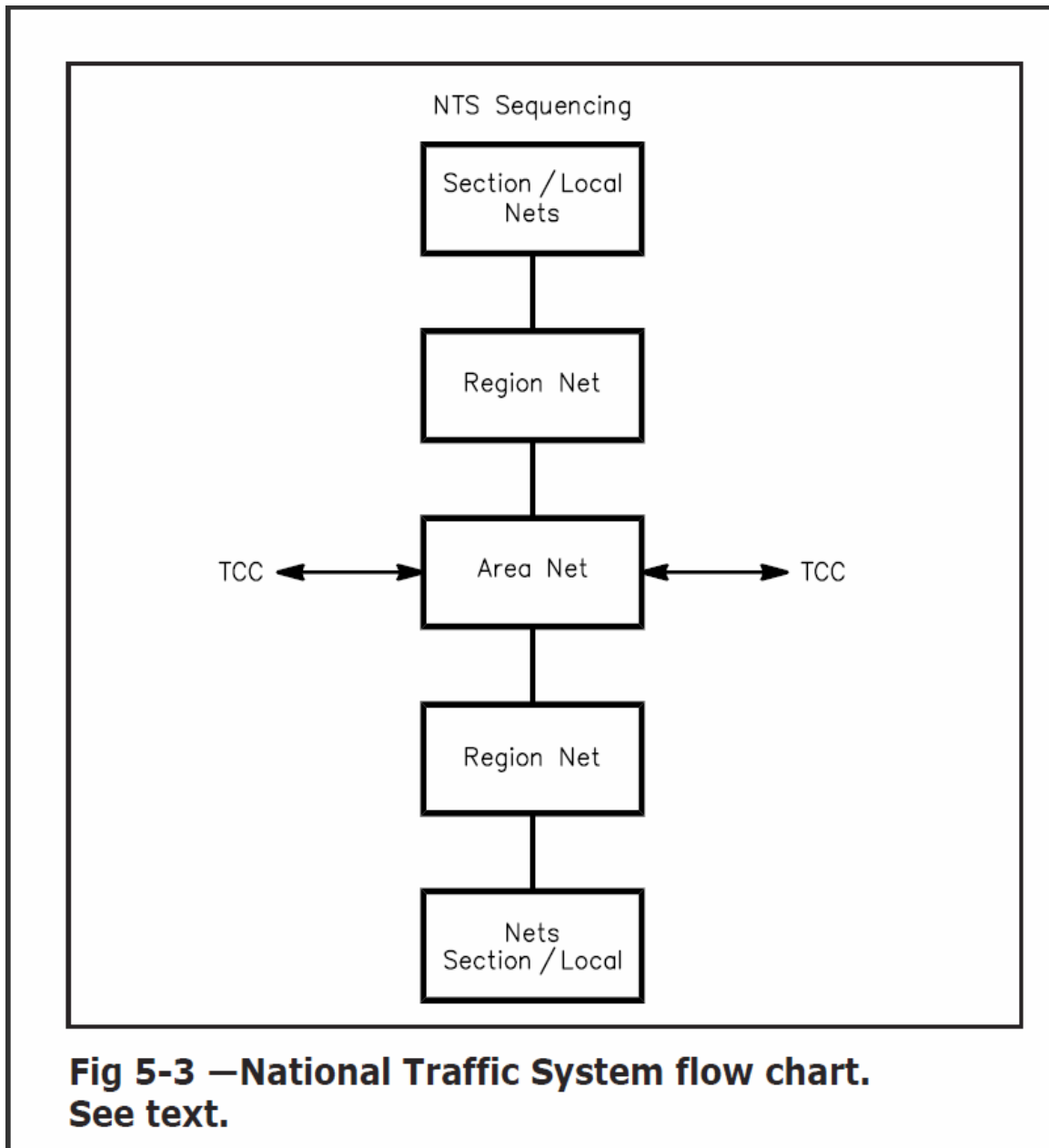
Review an example of an NTS message routing in the NTS manual at:
http://www.arrl.org/chapter-nine-nts-traffic-routing.

"Hotline" Circuits

In certain situations, a large volume of traffic may be moving between two locations, such as from a large refugee center to an American Red Cross office. Rather than attempting to move these messages through the normal system, a "hotline" circuit is established between two or more stations at or near these locations. This avoids overloading normal nets, and speeds delivery of critical messages.

Increased Operations During Disasters

In day-to-day operation, the National Traffic System passes routine messages around the country. In its emergency role, the NTS is dedicated to disaster communication on behalf of ARES. The NTS is capable of expanding its cyclic operation partially or fully depending on the level of need. The normal cycles can be expanded to handle an increasing volume of messages with greater speed. In extreme cases, the cycles can operate continuously. This requires all nets to be on the air full time, with stations designated for liaison operation replacing each other as stations are dispatched to the higher or lower nets with which they make liaison.

Activation for Disasters

Emergency Coordinators in disaster areas consult with served agencies to determine which communication resources will need to be activated.

The Section Emergency Coordinator, working along with and in direct communications with the appropriate Section Manager(s), consults with affected DECs and ECs, and makes an activation recommendation to the Section Traffic Manager, and Section or Regional NTS managers as appropriate. The decision to alert the NTS Region management may be made by any combination of these officials, depending upon the urgency of the situation.

The scope of the activation will depend on the scope of the disaster. If messages need to be passed only within the Section, then only those nets will be activated. However, if the disaster is widespread and communications are disrupted over a large area, Region or Area nets may be needed. In such cases the Traffic Managers and SEC's, working with their Section Managers will need to coordinate the effort between sections or regions. The TCC then needs to become involved. Handling outbound Health and Welfare (H&W) traffic has a higher priority than inbound H&W – each outbound H&W message delivered may head-off several more H&W inquiries about the same person, since the person receiving the outbound H&W message may share the news with other friends and relatives.

Managers of NTS nets at local, Section, Region, and Area levels are directly responsible for activation of their nets at the request of ARES or NTS officials. Each EC is directly responsible for activating their local ARES nets.

NTS Alerting Plan

Section Traffic Manager (STM) and Section Net Manager Roles:
During a disaster, the STM and certain Section net managers may be contacted by the Section Emergency Coordinator or the Section Manager to activate needed Section NTS and ARES nets, either to provide Section-wide contact or, in the case of NTS nets, to provide liaison with the nets outside the Section.

The STM and Section Net Managers make contact with NTS Region Net Managers in the event that messages connected with the disaster need to cross Section boundaries, and may recommend extraordinary activation of the Region net.

Specific Section net stations are designated to conduct liaison with the NTS Region net, either through another Section net or directly. This is the responsibility of Section officials, not the Region net manager.

Region Net Manager Functions:
Should a disaster situation's needs extend beyond the Section level, any one of the Section officials in a Region or a neighboring NTS Region may contact the Region Net Manager. The Region Net Manager should be able to predict such contact based on the circumstances, and should be available to receive their recommendation.

The Region Net Manager makes contact with the NTS Area Net Manager in the event that communications connected with the disaster transcend Region boundaries, recommending extraordinary activation of the Area NTS net.

Area Net Manager Functions:
There are only two Area Net Manager appointees for each of the three Areas in the US, but their function during and after disasters is of paramount importance. Area Net Managers maintain a high sensitivity to disasters that extend to or beyond Region boundaries. When one does, Area Net Managers take the initiative to alert the Region Net Manager involved to determine if extraordinary NTS operation is indicated.

In the event that high-precedence inter-Area traffic is involved, the Area Net Managers contact the two Transcontinental Corps directors in the Area to assist by arranging to pass the traffic directly to other Areas.

The Area Net Managers in the affected Area also contact the other NTS Area Net Managers to discuss the possibility of opening extra net sessions if required to handle the traffic reaching them through NTS inter-Area handling. Under some circumstances, direct representation or "hotlines" may be indicated.

The Area Net Managers maintain close contact with all Region Net Managers in the Area and make decisions regarding overall NTS operation in consultation with them.

Transcontinental Corps (TCC) Directors:
These NTS officials will be involved only where traffic of a precedence higher than "routine" is to be handled between NTS Areas, or when extreme overloads are anticipated. TCC Directors are ready to alert TCC members and set up special out-of-net schedules as required. TCC Directors may be called upon by the Area Net Manager to set up "hotline" circuits between key cities involved in heavy traffic flow. TCC Directors know which of their TCC stations are located in, or close to, large cities to operate such circuits.

Area Staff Chair Responsibilities

The three Area Staff Chairpersons administratively oversee the NTS Officials and their operations above the Section level, and will advise their TCC Directors, and Area and Region Net Managers when appropriate. Their advice may be based on information forwarded by ARRL Headquarters. The chair maintains a high sensitivity to disasters and other emergencies that may develop. In a large-scale disaster, the chairperson should be able to contact one another via the International Assistance and Traffic Net and on other prearranged nets.

General Policy for all NTS Operators

NTS operators should be "self-alerting" to disaster conditions that might require their services, and should check-in to their regular net or perform assigned functions without being specifically called upon. Assignments should be worked out with the Net Manager in advance. If the operator cannot answer the question, "If I hear of a disaster, what should I do?" they should seek an answer through their Net Manager. It may be as simple as "report into the X Net on Y frequency."

If the operator concerned is highly specialized, it might be "report to your TCC director in the X net on Y frequency for a special assignment." Such an assignment might be an extra TCC function, or it might be as a functionary in a "hotline" point-to-point circuit needing special abilities or equipment.

Most NTS operators participate for one or two periods a week, and some are active daily. Although every net member should have a specific assignment, they must also remain flexible enough to change assignments when the need arises.

Read about Digital Communication and NTS:
Late in 2010 the Area Staff Chairs of the NTS approved updates to the ARRL *Public Service Communications Manual* (PSCM) Appendix B, Methods and Practices Guidelines, Chapter 6, NTSD and *Radio-email*. These revisions provide for a structure and guidance on how the ARRL Field Organization may use Radio-email to provide nation-wide messaging in the modern email format via Amateur Radio with near real-time delivery anywhere in the country, 24/7. It also provides for integration of the ARES®, NTS and NTSD efforts nation-wide.

The new *Radio-email* system uses the Winlink 2000 network, infrastructure independent local automatic email service modules, plus station-to-station, radio-all- the-way transport services provided by the NTS/D to support all Sections. The Winlink 2000 network also provides us with a firewall and white list protected interface with the public internet for handling welfare and partner messaging with internet addresses. New types of message formats are included, and guidance on handling ICS-213 and other similar message formats is included.

As with any email system, it is necessary to know the addresses of stations on the network in order know how to address messages. *Radio-email* may be sent to multiple addressees with multiple copies and binary attachments. NTSD is assigning client Target Station addresses to be

the outlet clients for messaging on the network. What this means for you, for example, is the ability to send public welfare emails from shelter victims directly to internet addresses, or at other shelters, and receive replies. You may also send Radiograms in the standard ARRL format, carried by *Radio-email*, directly to network stations in the NTS/D for handling. You may have partner and our own leadership officials, using their own computers, exchange *Radio-email* messages between all sites where amateur field stations are deployed. In each of those examples, no intermediate relaying manpower or nets are required within your "last mile" disaster area.

Reference Links

For more on NTS, see Section 2 of The ARRL Operating Manual.

NTS manual   http://www.arrl.org/chapter-one-national-traffic-system

Additional details on ARES and NTS can be found in the Public Service Communications Manual at:
http://www.arrl.org/files/file/Public%20Service/ARES/ARESmanual2015.pdf

For local information, or to learn more about NTS net operation in your area, contact your Section Manager (SM) http://www.arrl.org/sections or Section Traffic Manager (STM).

For a list of ARES and NTS nets operating in your area see The ARRL Net Directory at http://www.arrl.org/arrl-net-directory.

Review

The National Traffic System is a set of scheduled nets operating on a cycle that permits messages to be routed across the country in less than 24 hours. The cycles can be increased to allow for larger volumes of messages to be handled during an emergency. Nets operate at the local, Section, Region, and Area levels. The Transcontinental Corps can help expedite critical messages by bypassing the normal routes. Hotline circuits can be established between high-volume locations when needed. NTS nets provide a great venue for participants to practice using phonetics, and paying focused attention to details – which are required to take traffic and operate as an effective NCS.

Activities

1. List at least two resources for locating emergency nets that operate in your area.

2. Identify at least three emergency nets (days, times, frequencies) that operate in your area, including an NTS net if possible.

3. Contact the Net Control Station for at least one of the nets you have identified. Determine

the requirements for joining the net.

Welcome to Topic 15 Knowledge Review

Please review the following questions to improve your understanding of this topic:

Question 1:

Which of the following statements about the National Traffic System is *true*?

a) It is highly reliant upon CW.

b) It was designed within the last 25 years.

c) Each net within the System is an independent, "stand alone" entity.

d) It is a unique system for efficiently handling messages.

Question 2:

The Area Nets include which of the following?

a) The Eastern, the Central, the Canadian, and the Pacific.

b) The Eastern, the Central, the Mountain, and the Pacific.

c) The Central, the Mountain, and the Canadian.

d) The Eastern, the Central, and the Pacific.

Question 3:

Which is the purpose of a "hotline circuit?

a) To move a modest amount of routine traffic between two locations in a small town.

b) To move a moderate amount of traffic between two partner agencies across the country.

c) To move a high volume of traffic between two locations during a disaster.

d) To move a high volume of holiday traffic across the country.

Question 4:

Which of the following statements is *true*?

a) NTS was designed to compete with independent traffic networks.

b) NTS generally encompasses five different levels of operation.

c) Section nets exclusively handle traffic between Local and Regional nets.

d) Regional Nets handle traffic among Sections within their Region.