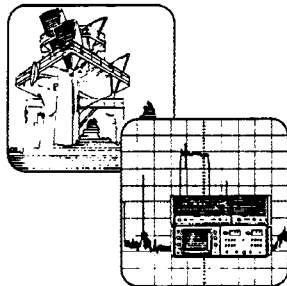


What is 9-1-1?

Management Briefing Number 3

ONE OF A SERIES OF NOTES ON
TECHNOLOGY FROM ADCOMM

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This short paper offers discussion on nontechnical issues related to 9-1-1 systems. It is done as an aid to managers and others with limited technical knowledge of communications. The use of some telephone jargon and terminology is unavoidable, but terms are explained as needed.

WHAT IS 9-1-1?

The three digit number 9-1-1 is intended to act as a nationwide emergency telephone number that provides citizens with access to emergency fire, medical, and police assistance. When implemented, it replaces the numerous seven-digit numbers used for reporting an emergency and requesting assistance. 9-1-1 is provided as a public service with the primary objective of preserving life and property. 9-1-1 service is available in three forms. They are:

Basic 9-1-1 — No telephone number or address display (also known as (B)9-1-1).

9-1-1 w/Automatic Number Identification (ANI) — Telephone number display (also known as (C)9-1-1).

Enhanced 9-1-1 — Telephone number and address display, precision call routing (also known as (E)9-1-1).

These forms and their associated technologies are explained in Adcomm Engineering's Management Briefing Number 4, "9-1-1 Technology." Each of these technologies has a different level of complexity and cost. See Figure 1 for illustration.

The choice of the digits 9-1-1 in this country was based upon a number of factors, including the comparative ease with which telephone company equipment could be modified to accept the numbers. Studies have shown that the combination of the digits 9-1-1 easily could be remembered and dialed by most persons.

Public interest in 9-1-1 has been attributed to several factors: growing public concern about high crime rates, a dramatic increase in the number of medical emergencies and accidents, and an awareness that current emergency reporting methods are inadequate. Recent television shows such as "Rescue 911" have brought 9-1-1 into the public eye, with the result that many people assume they have 9-1-1 service, though there are areas where it is not available. With a population as large and as mobile as that found in North America, a common, widely available emergency number makes sense.

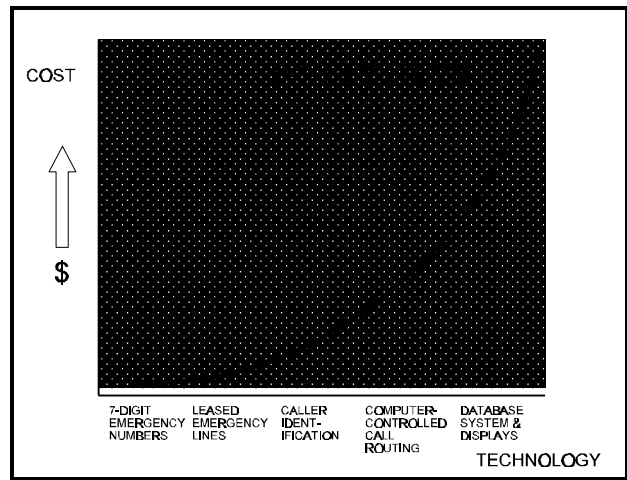


Figure 1—Technology comes at a cost.

It is often-stated belief that 9-1-1 is simply a phone number, no more, no less. It was planned that this is all the citizen requiring emergency services would ever need to know; but for those planning emergency systems and for those public policy makers who must make important decisions concerning 9-1-1, more knowledge is essential. In reality, 9-1-1 is a whole system made up of sophisticated equipment and trained personnel, involving close cooperation among the political jurisdictions in the served areas. To the general public, 9-1-1 has come to embody emergency aid (see Figure 2). Often "9-1-1" is blamed for slow response by a police or fire agency, when in fact the call-answering point or dispatch center handled the call properly, but there was no assistance available. Again this perception by the public has been brought about by the success of 9-1-1 systems and the publicity in the press — the crime victim on a television show calls 9-1-1 and help arrives. The complex process of receiving, handling, and dispatching a call is glossed over as trivia by the media.

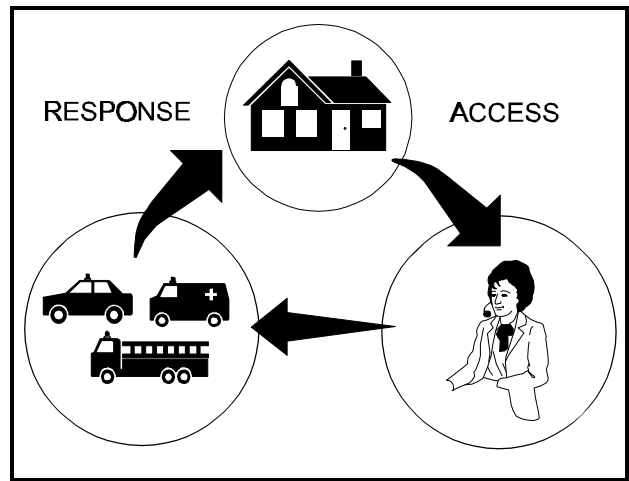


Figure 2—Emergency Access and Response are two things, though often seen as one.

It is important to note that when an emergency call is dialed and answered at the 9-1-1 answering-point (known as a public safety answering point or PSAP), the 9-1-1 system has fulfilled its principal purpose. Call processing at the dispatch center is the other aspect of the response system. A 9-1-1 system does not necessarily include agency dispatch. Call answering and dispatch can be handled in one place or at separate locations if desired, although there are usually financial and operational benefits to consolidation.

ESSENTIAL ELEMENTS

The *first element* of a 9-1-1 system is telephone equipment. The telephone company (telco) must provide special switching equipment in each central office capable of recognizing the 9-1-1 sequence and routing it to the appropriate line. Most telephone companies operating in the state of Washington have installed 9-1-1 compatible equipment. Telephone company 9-1-1 lines are dedicated for emergency calls; this means lines that do not have to be shared with other, general-purpose users. These dedicated circuits replace the 7-digit emergency numbers formerly called by citizens to gain access to public safety agencies. It is generally recommended that these old emergency lines be kept for a transition period of 2 years after the start of 9-1-1 services. These lines could be used by telephone company operators to report emergencies and as an extra seven-digit nonemergency number at the PSAP.

The *second element* of the 9-1-1 system is human. 9-1-1 calls are answered by people specially trained to guide the caller in providing enough reliable information for notification of the proper response unit. In many small agencies, dispatching is done by a city hall switchboard operator or

a clerk-dispatcher to whom call answering and dispatch represents a small portion of overall duties. The larger PSAP or agency uses a full-time call answerer/dispatcher who is able to concentrate on the job at hand and attain a level of proficiency difficult to achieve in the former situation. This is an important factor when considering dispatch center consolidation.

The *third element* is structural and requires joint action by local governments. The phone company does not independently establish the service, perform feasibility studies, or develop implementation plans. Local governments must actively cooperate to create such systems. Each system is different from the next. In fact, each affected public and private safety agency must agree to 9-1-1 service in writing before the telephone company will act. Citizens and public and private safety agencies have major roles in shaping the system to meet their special needs. The system should be developed to perform at the convenience of the citizen, while providing information to service providers that is timely and complete enough to make an appropriate response.

WHAT DOES 9-1-1 DO?

Part of what 9-1-1 does is made possible by the equipment features; part comes about through the training and abilities of people.

Interestingly enough, implementation of 9-1-1 gives public officials, public safety agencies and citizens an opportunity for focused rethinking of the concepts and procedures in use. It also provides a motive for cooperation in solving problems encountered in the development of each system. Most important though, the concept of 9-1-1 is simple, quick, single-point access to emergency services. Let us briefly explore what this simple concept means practically.

When a person dials 9-1-1, the telco central office switching equipment "recognizes" the unique number and transfers the call into a dedicated line that is connected to a PSAP. With (B)9-1-1 and (C)9-1-1 service, all telephones sharing the same prefix will be routed to the same PSAP. (E)9-1-1 service allows the call to be routed to a PSAP that is determined by the calling telephone's address. For example, a telephone located in downtown Ephrata could have a 9-1-1 call routed to the Ephrata Police Department. A call from a telephone with the same prefix located in the county could have the call routed to the county sheriff.

When the PSAP receives the call on its specially designated emergency lines, the call is immediately recognized as an emergency and is given top priority over all other activities. Secondly, unlike seven-digit emergency lines currently in use, 9-1-1 lines may have some useful special features depending upon the specific telephone company. (See Adcomm Management Briefing Number 4, "9-1-1 Technology," for a discussion of these special features.)

Citizens appreciate the fact that with 9-1-1 there are few decisions to be made during an emergency. Remember that a caller has no real interest in who answers the phone; only that the proper response be rendered as quickly and efficiently as possible.

ADVANTAGES OF 9-1-1

9-1-1 has benefits to both citizens and public safety agencies.

BENEFITS TO *CITIZENS*

The 9-1-1 emergency telephone system shifts the burden of responsibility away from the citizen requiring emergency services to local governments. 9-1-1 makes citizen access convenient, faster, and easier for the following reasons:

Only One Number To Remember. Many public safety agencies attempt to facilitate citizen access for emergencies by listing a single seven-digit telephone number. Generally, those numbers feature many zeros or ones to promote easy recall. Many public safety agencies go to great lengths to bring their emergency numbers to the attention of the public. In almost all cases, the percentage of persons who have memorized the unique emergency telephone numbers in their area is significantly less than desired. Surveys show that from 10 percent to 30 percent recall the emergency numbers. This problem is compounded by the following:

- In any given area, there may be separate emergency telephone listings for fire, police, and emergency medical services.
- The same telephone company central office area is often served by more than one public safety agency providing similar services. An example of this is the Washington State Patrol and the county sheriff.
- Citizens often do not have a clear sense of the boundaries of fire districts or ambulance service areas (i.e., which agency serves my area?).
- The listing of emergency numbers on the front inside cover of the phone book is often lengthy and printed in small type.
- Ambulance services are often listed in the white pages under the company name or the yellow pages under "ambulance service."

A person may face these difficulties in a period of intense mental and/or physical stress. This most likely will reduce an individuals ability to remember and dial the correct number.

9-1-1 overcomes these problems. 9-1-1 is the only emergency telephone number one must remember regardless of the nature, location, and severity of the emergency. With the great amount of publicity given 9-1-1 over the years, most people remember 9-1-1 is the emergency number. Surveys taken a few years after the introduction of 9-1-1 showed that 92 percent of the population samples were aware of the introduction of 9-1-1 into their community. Further, 97 percent of all emergency calls were subsequently made via 9-1-1.

- # 9-1-1 Is An Easy Number To Remember. Psychologists have learned in recent years that the maximum number of digits most persons consistently remember is nine. Seven-digit emergency numbers are close to this limit and prove to be difficult for the average person to remember. If the number is not used on a regular basis, the tendency is to forget it.

Studies have shown that, in some areas, up to 60 percent of emergency calls come in via the telephone company by dialing "0" (operator). This is, in part, due to the fact that "0" for operator is an easy number to remember and is used when the nature of the incident is such that there is little time to look up the correct emergency telephone number.

- # 9-1-1 Is An Easy Number To Dial. Dialing a three-digit number is obviously easier than dialing a seven-digit number. It reduces dialing errors in several ways. Transposing numbers is quite easy when dialing seven-digit numbers and quite a remote possibility when dialing 9-1-1. The short length of the number speeds dialing and reduces errors. The numbers "9" and "1" are easy to find on a touch-tone keypad or rotary dial, making it easy for persons to call even if they do not have their glasses or if it is dark.

BENEFITS TO PUBLIC SAFETY AGENCIES

- # Reduction In Response Time. 9-1-1, along with an efficient method of call processing, reduces response time to time-critical incidents such as fires and medical emergencies. When response time is measured from the initial occurrence of the incident to the on-scene arrival of a response unit, the time savings of 9-1-1 become apparent. The elements of an emergency response are:

- Incident
- Occurrence
- Detection
- Decision-to-Call
- Notification
- Dispatch
- Arrival-On-Scene

Substantial time savings occur in two areas:

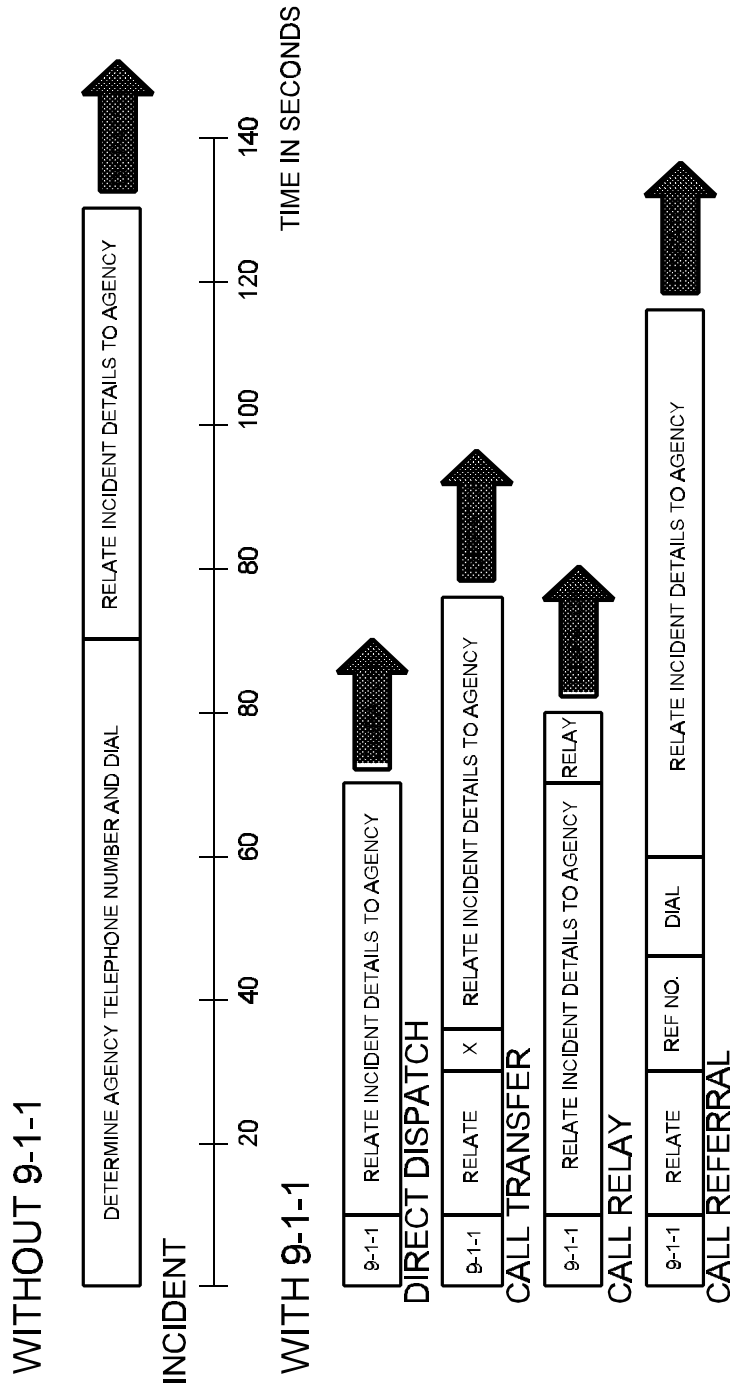
- Decision To Call. 9-1-1 reduces the hesitancy to call; however, this will mean an increase in call volume and an increase in duplicate calls on major incidents along with the time savings.
- Notification. 9-1-1 also lessens the time to find or confirm the proper number to call. It reduces the number of decisions the caller must make. In addition, it reduces the time to dial. The number of misdials and wrong numbers dialed under stress are nearly eliminated.

This translates into faster response by public safety agencies. Figure 3 relates some interesting findings on the influence of 9-1-1 and the dispatch type in use. In many serious medical emergencies, the first few minutes are vitally important to patient recovery. The first few minutes of a fire are the most important in containing the spread of a blaze. In law enforcement, a shortened response time to in-progress crime increases the likelihood of making an arrest.

- # Priority Calls Immediately Identified. 9-1-1 calls come into the PSAP on dedicated trunks. Emergency and business calls are thus segregated and can be given special immediate attention and a faster response provided. Call answerers appreciate this feature as it allows them to prioritize calls immediately, without lengthy interrogation of the caller. It also provides call answerers with a brief period to prepare mentally for the handling of an emergency versus a routine call.

- # Improvements In Overall Communications System Performance. Three factors usually contribute to this effect. The first is that 9-1-1 generally encourages public safety agencies to cooperate more closely to plan, implement, and operate 9-1-1 centers. The second factor is that, in almost all cases, 9-1-1 planning acts as a catalyst to the reconfiguration of the entire public safety communications system in the planned service area. This usually introduces more modern equipment, procedures, and management techniques than previously existed. Third, 9-1-1 generally requires a thoroughly planned, comprehensive approach to public safety call answering and communications, often times absorbing underfunded single-purpose systems that evolved slowly over many years and are now struggling to cope with call volumes they were never designed to handle.

SPEED AND 9-1-1



SOURCE: STANFORD RESEARCH INSTITUTE

Figure 3—In emergencies, when seconds count, 9-1-1 saves time.