



NHS England Emergency Preparedness, Resilience and Response (EPRR)

Resilient Telecommunications Guidance for NHS England and the NHS in England



NHS England INFORMATION READER BOX		
Directorate		
Medical	Operations and Information	Specialised Commissioning
Nursing	Trans. & Corp. Ops.	Strategy & Innovation
Finance		
Publications Gateway Reference: 07054		
Document Purpose	Guidance	
Document Name	Resilient Telecommunications Guidance for NHS England and the NHS in England	
Author	NHS England EPRR	
Publication Date	Jan 2019	
Target Audience	CCG Clinical Leaders, CCG Accountable Officers, CSU Managing Directors, Care Trust CEs, Foundation Trust CEs , NHS England Regional Directors, NHS England Directors of Commissioning Operations, Communications Leads, NHS Trust CEs, EPRR Specialists	
Additional Circulation List		
Description	Telecommunications are a fundamental enabler underpinning the effective response to any emergency. Resilient communications are able to absorb or mitigate the effects of a disruptive challenge. This document provides guidance to NHS England and NHS-funded organisations in England of the minimum requirements to support resilient telecommunications .	
Cross Reference	N/A	
Superseded Docs (if applicable)	N/A	
Action Required	N/A	
Timing / Deadlines (if applicable)	N/A	
Contact Details for further information	National Head of EPRR EPRR Unit Skipton House 80 London Raod SE1 6LH https://www.england.nhs.uk/ourwork/epr/	
Document Status		
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Document Title: Resilient Telecommunications Guidance for NHS England and the NHS in England

Version number: 1.0

First published: January 2019

Prepared by: Regional Head of EPRR, NHS England (Midlands & East)

Classification: OFFICIAL

This material should be read in conjunction with the NHS England Emergency Preparedness, Resilience and Response Framework.

All material forming the guidance is web based and prepared to be used primarily in that format. The web-based versions of the Guidance including underpinning materials have links to complementary material from other organisations and to examples of the practice of and approach to emergency planning in the NHS in England.

The web version of the guidance is available at <http://www.england.nhs.uk/ourwork/epr/>.

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1 Introduction

The NHS needs to be able to plan for and respond to a wide range of incidents and emergencies that could affect health or patient care.¹

Telecommunications are a fundamental enabler underpinning the effective response to any emergency. Resilient communications are able to absorb or mitigate the effects of a disruptive challenge. A disruptive challenge is an event or circumstances that disrupts normal life. These can be natural events such as flooding, or may have occurred through human intervention such as an electrical power failure or terrorist incident.²

1.1 Purpose

This document provides guidance to NHS England and NHS-funded organisations in England of the minimum requirements to support resilient telecommunications to help meet the statutory requirements of the Civil Contingencies Act 2004 (CCA 2004) and the NHS Act 2006 as amended by the Health and Social Care Act 2012 (NHS Act 2006 (as amended)).

As a minimum, each organisation must have at least one primary communications system and at least one fixed or mobile secondary back up system, which should be interoperable with partner organisations.

1.2 Objectives

The objectives of this document are to ensure:

- Sufficient resilience capacity and diversity to maintain fully functional major incident and emergency management arrangements in the event of a major communications bearer failure (e.g. loss of landlines).
- Layered resilience such that multiple failures result in a gradual degradation of service rather than complete failure.
- Maintenance of critical organisational infrastructure strategies to manage emergency situations.
- Resilience and diversity for mobile services.

¹ NHS England (2015). EPRR Framework

² Cabinet Office (2016). Resilient Communications

2 Context and Scope

2.1 Context

Good communications are at the heart of an effective response to and recovery from, an emergency and responders should plan for disruption to their communications.³

Resilient communications planning is part of broader emergency planning and preparedness and should take account of:

- Community Risk Registers that provide an insight into the types of local situations that might cause disruption, which include natural events such as adverse weather, or circumstances that have occurred through human intervention such as electrical power failure or a terrorist incident.
- The National Risk Register (NRR) that identifies a number of situations that could potentially disrupt telecommunications.

2.2 In Scope

This Guide sets out the minimum operational communications functions and communications equipment and networks to enable NHS England and NHS-funded organisations in England to discharge their statutory responsibilities in maintaining critical functions of patient safety during a major incident or significant service disruption.

Statutory responsibilities and expectations of healthcare providers relating to major incidents are set out in the Civil Contingencies Act 2004, the NHS Act 2006) (as amended) and the NHS England Emergency Preparedness, Resilience and Response (EPRR) Framework.

A telecommunications Glossary is at Appendix One.

2.3 Out of Scope

This Guide does not address the physical hardening of buildings to protect against specific physical threats such as weather or blast. This document is not intended to compete with public telephone operators for the supply of communications infrastructure for standard operations and it does not explain the complexities and resilience of different types of communications networks or data protection requirements.

Links to more in-depth resilient communications details are at Appendix Two.

³ Cabinet Office (2013). Emergency Response and Recovery, Chapter 6: Resilient Telecommunications

3 Resilient Communications

3.1 Incident Management

In the event of a major incident, emergency or planned disruption, NHS England provides incident management command, control, co-ordination and communications arrangements at national, regional and/or local levels.

Clinical commissioning groups (CCG) and providers of NHS funded care should have robust and effective structures in place to adequately respond to a major incident or emergency, both internally and with their local healthcare partners.

Incident managers at all levels rely upon communications resilience; diversity, separacy and redundancy. This depth of communications helps mitigate against a single point of failure. NHS England (national, regional and local) and the NHS in England should follow the generic principles set out in Table One for enhancing communications resilience⁴.

To maintain operational effectiveness, telecommunications hardware and software systems should be routinely tested and relevant staff appropriately trained in its use.

Table One- Generic Principles

Principle	Description
Looking beyond the technical solutions at processes and organisational arrangements	The way in which responders organise themselves, the processes used in communicating (such as agreed protocols that make conference calls work smoothly) and the technical arrangements that enable communications to be achieved over distance and on the move, should command equal attention and recognition that none of these three components should be considered in isolation.
Identifying and reviewing the critical communications activities that underpin response arrangements	Increasingly, work is in an environment constrained by resources, so it is vitally important that focus should first be given to critical activities that are essential to the effectiveness of response arrangements. Organisations processes, and technologies change arrangements, need to be reviewed as appropriate.
Ensuring diversity of technical solutions	When using different telecommunications systems it is often not apparent that they are dependent on the same underlying infrastructure – a failure there can affect many different platforms. Public mobile (cellular) networks are dependent, to varying degrees, on core and access networks (that deliver land-line telephone services) - failure or degradation here can affect mobile services. While core telecommunications networks can survive for many days without grid distributed electricity, organisational systems may not and mobile systems are unlikely to be operational for more than an hour. It is important to review local arrangements underpinning critical communications to reduce as far as possible such common means of failure.

⁴ Cabinet Office (2013). Emergency Response and Recovery, Chapter 6: Resilient Telecommunications

Principle	Description
Adopting layered fall-back arrangements.	No means of communicating is going to be available all the time, for example faults occur and systems become congested. Such problems can be mitigated by adopting a layered approach to critical communications so that if preferred means becomes unavailable, processes are in place to seamlessly fall-back to other arrangements.
Planning for appropriate interoperability.	During a response to an emergency, responders will be working alongside colleagues and other organisations, and it is vitally important that appropriate information can be shared. For sharing to be effective, both the soft issues, (the organisational and processes), and the hard, (telecommunications equipment and systems), must be appropriately interoperable.

3.2 Operational Communications Functions

To enable a major incident or emergency to be effectively managed and information shared in a timely manner, a number of operational communications functions are required to be maintained. The operational communications functions are supported by both fixed and mobile communication systems.

Operational communications functions should not rely upon single methods of communications but should provide layered resilience such that multiple failures result in a gradual degradation of service rather than complete failure.

As communications systems rely upon power generation, consideration should also be given to resilient power supplies, which should be on different power distribution routes. Alternatively, a secondary/ fall back site on separate power distribution routes that provides the same functionality as the primary site, should be available.

NHS England and each NHS-funded provider should review the operational communications functions set out in Table Two and identify the most effective mix of fixed and mobile communications systems for their organisation to support every relevant communications function. Examples of using Table 2 are provided for local use.

As a minimum, each operational communications function must have at least one primary communications system and at least one fixed or mobile secondary back up system and both systems are to be inter-operable with partner organisations.

Organisations/ Local Health Resilient Partnerships (LHRP) should map the inter-operability of each partner organisations' identified communications systems.

In addition, all organisations are to ensure that **key incident response staff who reply upon mobile telephones** are to have a system to preserve access to mobile networks when the network capacity is under pressure (e.g. MTPAS).

Table Two - Operational Communications Functions

Communications Functions	Fixed Communications Systems	Mobile Communications Systems	Primary Communications System Selected	Secondary Communications System Selected
<i>Example 1</i> <i>Public Switched Telephony Network (PSTN)</i>	<i>Example 1</i> <ul style="list-style-type: none"> • <i>Internet-based services (e.g. VoIP telephone)</i> • <i>Telephone Fax machine</i> • <i>Analogue telephone separate from the building's digital switchboard</i> • <i>Commercial facilities (e.g. call centre)</i> 	<i>Example 1</i> <ul style="list-style-type: none"> • <i>NHS-issued mobile telephone</i> • <i>Satellite telephone voice service</i> 	<i>Example 1</i> <ul style="list-style-type: none"> • <i>VoIP telephone service</i> 	<i>Example 1</i> <ul style="list-style-type: none"> • <i>NHS-issued mobile telephone</i>
<i>Example 2</i> <i>Public Switched Telephony Network (PSTN)</i>	<i>Example 2</i> <ul style="list-style-type: none"> • <i>Internet-based services (e.g. VoIP telephone)</i> • <i>Telephone Fax machine</i> • <i>Analogue telephone separate from the building's digital switchboard</i> • <i>Commercial facilities (e.g. call centre)</i> 	<i>Example 2</i> <ul style="list-style-type: none"> • <i>NHS-issued mobile telephone</i> • <i>Satellite telephone voice service</i> 	<i>Example 2</i> <ul style="list-style-type: none"> • <i>VoIP telephone service</i> 	<i>Example 2</i> <ul style="list-style-type: none"> • <i>Analogue telephone</i>
Public Switched Telephony Network (PSTN)	<ul style="list-style-type: none"> • Internet-based services (e.g. VoIP telephone) • Telephone Fax machine • Analogue telephone line separate from the building's digital switchboard • Commercial facilities (e.g. call centre) 	<ul style="list-style-type: none"> • NHS-issued mobile telephone • Satellite telephone voice service 		

Communications Functions	Fixed Communications Systems	Mobile Communications Systems	Primary Communications System Selected	Secondary Communications System Selected
Data sharing capability up to <i>Official-Sensitive and Patient Identifiable</i>	<ul style="list-style-type: none"> • Local Area Network (LAN) cable or Wi-Fi connected • Wide Area Network (WAN) cable or Wi-Fi connected • Fax machine 	<ul style="list-style-type: none"> • NHS-issued data service enabled communicator ('iPad/pocket PC', 'smart phone' or Blackberry type device) • Satellite telephone data service • Hard/paper copy 		
Internet Service	<ul style="list-style-type: none"> • NHS-installed internet web browser 	<ul style="list-style-type: none"> • NHS-issued internet service enabled communicator ('iPad/pocket PC', 'smart phone' or Blackberry type device) 		
Collaboration/ file-sharing server accessible from the internet	<ul style="list-style-type: none"> • NHS-installed shared IT service areas • Commercial data storage services 	<ul style="list-style-type: none"> • Web-based shared service (e.g. SharePoint) • Resilience Direct • Commercial data storage services 		
Key-staff public wide area paging or alerting system	<ul style="list-style-type: none"> • Internet-based services (e.g. VoIP telephone) • Telephone Fax machine • Analogue telephone line separate from the building's digital switchboard • Commercial facilities (e.g. call centre) 	<ul style="list-style-type: none"> • NHS-issued mobile telephone • Satellite telephone voice service • Mass notification system (e.g. Everbridge) • Paging system (e.g. PageOne, Vodafone,O2, Communications) • Digital Private Mobile Radio (e.g. TETRA / Airwave, Tetrapol) 		

Communications Functions	Fixed Communications Systems	Mobile Communications Systems	Primary Communications System Selected	Secondary Communications System Selected
		<ul style="list-style-type: none"> Private Mobile Radio (e.g. two-way VHF, UHF) 		
Monitoring of Public Service news broadcasts and social media	<ul style="list-style-type: none"> Digital television Internet-based services 	<ul style="list-style-type: none"> NHS-issued internet service enabled communicator ('iPad/pocket PC', 'smart phone' or Blackberry type device) Digital radio CB Radio/ Raynet 		
All organisations are to ensure that they have a system to preserve access to mobile networks by those key staff engaged in emergency response when the network capacity is under pressure	N/A	<ul style="list-style-type: none"> MTPAS 		
NHS England national is to ensure departmental ISDN voice and data connectivity up to 'Top Secret' and all UK caveats	<ul style="list-style-type: none"> E.g. BRENT 	N/A		
Acute trusts' Emergency Departments and ambulance trusts should ensure inter-organisational connectivity	<ul style="list-style-type: none"> Internet-based services (e.g. VoIP telephone) Telephone Fax machine Analogue telephone line separate from the building's digital switchboard 	<ul style="list-style-type: none"> NHS-issued mobile telephone Satellite telephone voice service 		

Communications Functions	Fixed Communications Systems	Mobile Communications Systems	Primary Communications System Selected	Secondary Communications System Selected
	<ul style="list-style-type: none">Commercial facilities (e.g. call centre)	<ul style="list-style-type: none">Digital Private Mobile Radio (e.g. TETRA / Airwave, Tetrapol, EMS)Private Mobile Radio (e.g. two-way VHF, UHF)		

Appendix One – Telecommunications Glossary

Term	Description
ACCOLC See Note 1	ACCess OverLoad Class is a tool that network operators use to manage their networks. It can be used to give privileged access to front-line emergency responders in an event of congestion on networks in the immediate aftermath of an incident.
ADSL	Asymmetric Digital Subscriber Line. Internet broadband connection provided over home telephone lines.
Airwave	A secure and resilient mobile telecommunications system for the police, ambulance and fire and rescue services. While primarily for their use, the system is also available to organisations with whom the emergency services need to communicate in responding to emergencies.
Analogue telephone line	A single non-digital copper cable that is run directly in to your building by your line provider.
BRENT telephone	BRENT is a secure ISDN telephone, which protects voice and data up to and including TOP SECRET and all UK caveats.
CB Radio	Citizens band radio is a system of short-distance radio communications between individuals.
Copper wire telephone line	See analogue.
Customer	A generic term used to describe the organisation who procures the telecommunications networks and services from the provider. It is synonymous with other terms such as Client, Subscriber and Account.
Data Sharing	Data sharing here generally refers to information that can be used to identify a living individual, and usually comes under the remit of the Data Protection Act 1998.
Diverse Routing	The routing of information using network components that can automatically provide alternative routes to avoid congestion or network failure
Diversity	Diversity ensures that specified circuits are not routed over the same cables or transmission systems. However there may be some common network nodes within the circuit routings. Diversity describes the ability to use, select or switch between different routes to avoid congestion or network failure.
EMS	See Airwave. Emergency Services Network is to be a replacement for Airwave.
Fax	Fax (short for facsimile), is the telephonic transmission of scanned printed material (both text and images), normally to a telephone number connected to a printer or other output device. Faxes can be sent by analogue telephony or digitally via a computer.

Term	Description
GPRS	General Packet Radio Service is a method of enhancing 2G phones to enable them to send and receive data more rapidly. It supports a wide range of bandwidths, is an efficient use of limited bandwidth and is particularly suited for sending and receiving small bursts of data, such as e-mail and Web browsing, as well as large volumes of data.
GPTS See Note 2	Government Telephone Preference Scheme was established in the late 1950s when there was a threat of nuclear war destroying significant parts of the national infrastructure. The scheme was designed to conserve power and provide assured access to telephony for essential users during an emergency.
GSM	Global System for Mobile Communications is a second generation (2G) standard for mobile networks. Good for voice calls but limited when sending or receiving data.
HITS	High Integrity Telecommunications System provides a resilient communications backbone between Strategic Co-ordination Centres (SCCs) in police force areas across England and Wales, and central government crisis management facilities.
Information Sharing	Information sharing here generally refers to any information that is non-personal. This includes plans, schematics, commercial or business data amongst others.
ISDN	Integrated Services Digital Network is a set of communication standards for simultaneous digital transmission of voice, video, data, and other network services over the traditional circuits of the public switched telephone network.
IP	Internet Protocol; the most commonly used network protocol.
LAN	Local Area Network is a computer network that interconnects computers within a limited area such as an office building and has its network equipment and interconnects locally managed.
MTPAS	Mobile Telephone Privileged Access System it is intended to preserve access to mobile networks by those engaged in an emergency response when network capacity is under pressure. Privileged access is limited in number and is achieved by the installation of a number special SIM card in the telephone handset.
N3 Network	N3 is a Wide Area IP Network (WAN), connecting many different sites across the NHS within England & Scotland. It also connects to other networks via Gateways, notably to the Internet via the Internet Gateway.
Private (non-public) Network	Any network used to communicate within an organisation (as distinct from providing a service to the public) or to supply such communications to organisations based upon configuration of their own or commercially leased facilities. The term includes networks used by private companies, state enterprises or government entities.
Provider	This is a generic term used within the Guide to describe the organisation which provisions and operates the telecommunications network infrastructure and related services. It is synonymous with other terms such as Supplier, Operator, Service Provider and Network Provider.

Term	Description
PSTN	Public Switched Telephony Network; consists of telephone lines, fiber optic cables, microwave transmission links, cellular networks, communications satellites, and undersea telephone cables, all interconnected by switching centers, thus allowing most telephones to communicate with each other.
Public Network	A network used to provide a service to the general public, usually on a subscription or other payment basis e.g. a national telephone system, exchanges, trunks and international links for providing telephones services to the general public, or public internet. This includes the components used to provide commercially leased facilities used to build private networks.
RAYNET	Radio Amateurs' Emergency Network is the UK's national voluntary communications service provided for the community by licensed radio amateurs.
Redundancy	Back-up systems duplicating functionality of the systems are available to take over in the event of component or system failure.
Resilience	The equipment and architecture used are inherently reliable, secured against obvious external threats and capable of withstanding some degree of damage.
Resilience Direct	An online private 'network' which enables civil protection practitioners to work together – across geographical and organisational boundaries – during the preparation, response and recovery phases of an event or emergency.
Restoration	The capabilities are in place to replace a failed system with a working one.
Satellite Telephone See Note 3	A type of mobile phone that connects to orbiting satellites instead of terrestrial cell sites. They provide similar functionality to terrestrial mobile telephones; voice, short messaging service and low-bandwidth internet access are supported through most systems.
Separacy	Ensures that specified circuits are physically separated throughout the network so that there are no common exchanges, interconnection points or cable routes. Physical and logical separation of a circuit or system from Source to Destination
SharePoint	A web-based secure place to store, organise, share and access information from almost any device.
SIM	Subscriber Identity Module is a removable smart card for mobile phones. SIM cards store the required information to identify the mobile device.

Term	Description
Single Point of Failure	The only (single) source of a service, activity and/or process i.e. there is no alternative, whose failure would lead to the total failure of an activity and/or dependency.
SLA	Service Level Agreement; A formal agreement between a service provider and their customer, which covers the nature, quality, availability, scope and response of the service provider. The SLA should cover day-to-day situations and disaster situations, as the need for the service may vary in a disaster. It should also cover service level guarantees.
SMS	Short Message Service. The GSM service for sending text messages to mobile handsets.
TETRA	TErrestrial TRunked RAdio, two-way digital radio technology.
VOIP	Voice Over Internet Protocol is a means of sending voice over the internet.
WAN	Wide Area Network is a computer network that interconnects computers over a large geographic distance, but also generally involves leased telecommunication circuits or Internet links.

NOTES

1. ACCOLC now superseded by MTPAS.
2. GTPS was decommissioned on 01 March 2017
3. Transportable terminals, deployable satellite terminals that could be set up at short notice in almost any location, were withdrawn from service at the end of 2013.⁵

⁵ Cabinet Office (2016). Resilient Communications

Appendix Two - Links to Resilient Communications

Cabinet Office (2016). *Resilient Communications*

<https://www.gov.uk/guidance/resilient-communications>

Emergency Response and Recovery: *Non statutory guidance accompanying the Civil Contingencies Act 2004*

<https://www.gov.uk/government/publications/emergency-preparedness>

Ensuring Resilient Telecommunications: *A Survey of Some Technical Solutions*

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/85842/resilient-telecomms-survey.pdf

Resilience in Converged Networks: *Good Practice Guidance*

http://www.cpni.gov.uk/Documents/Publications/2009/2009023-GPG_Resilience-guide.pdf

Telecommunications Networks – *a vital part of the Critical National Infrastructure*

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/85835/telecommunications-networks-v1.pdf

Towards Achieving Resilient Telecommunications: *Interim Guidance*

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/85833/resilient_comms_guidance.pdf