2021/2022 Severe Storms
Post-Incident Report

May 2022

EC-RRG
Electronic
Communications
Resilience &
Response Group
Protecting Communications

Executive Summary:
Purpose of this Report

What is the EC-RRG?

The Electronic Communications Resilience & Response Group (**EC-RRG**) is an industry group that takes the lead in developing and maintaining cooperation between the Communications Sector and Government on issues regarding resilience and emergency planning. We work together both in planning and responding for disruptive events, as well as promoting the availability and resilience of electronic communications across the UK.

Chaired by industry and supported by Government, the EC-RRG membership consists of a diverse group of fixed, mobile, broadcast & internet providers and also has representation from Ofcom, Cabinet Office, DLUHC, NCSC, CPNI, MoD and the Devolved Administrations. (illustrated to the right)

The EC-RRG owns and maintains the National Emergency Plan for Telecommunication, which provides the emergency response capability via a process called NEAT (the National Emergency Alert for Telecommunications). Further information can be found via the group's website: Electronic Communications Resilience & Response Group (EC-RRG) - GOV.UK

EC-RRG Post Incident Report (PIR) Executive Summary

The EC-RRG has undertaken a comprehensive Post-Incident Report (PIR) following the recent storms in 2021 and earlier this year (2022), this report therefore includes learnings from Storms: Arwen, Barra, Corrie, Malik, Dudley and Eunice. However, the report will focus on **Storm Arwen as a primary case-study,** given this was the first major storm, there is now more information available, and similar learnings are shared with all other recent storms.

While there is no intention to produce a PIR for every event of this nature, this seeks to compile the key findings of these extreme events, outline the impacts they had on the telecommunications network, and provide an action-plan for the group to take forward to improve resilience against similar events in future.

The **key finding** from this report is that the recovery process following each storm was protracted due to the volume and scale of power outages impacting Communication Provider's networks. This highlights the extent of interdependence between the Power & Communications Sectors, and of the need to build resilience across both industries through closer collaboration in future.

Objectives of this Post-Incident Report:

- **Outline the impacts** to fixed, mobile & broadcast networks of recent storms, using Storm Arwen as a case-study. .
- **Review the incident response & recovery** capabilities provided by Communication members.
- **Establish an action-plan** for the EC-RRG to drive and improve the Sector's resilience to similar incidents in future **(outlined in slide 6)**.
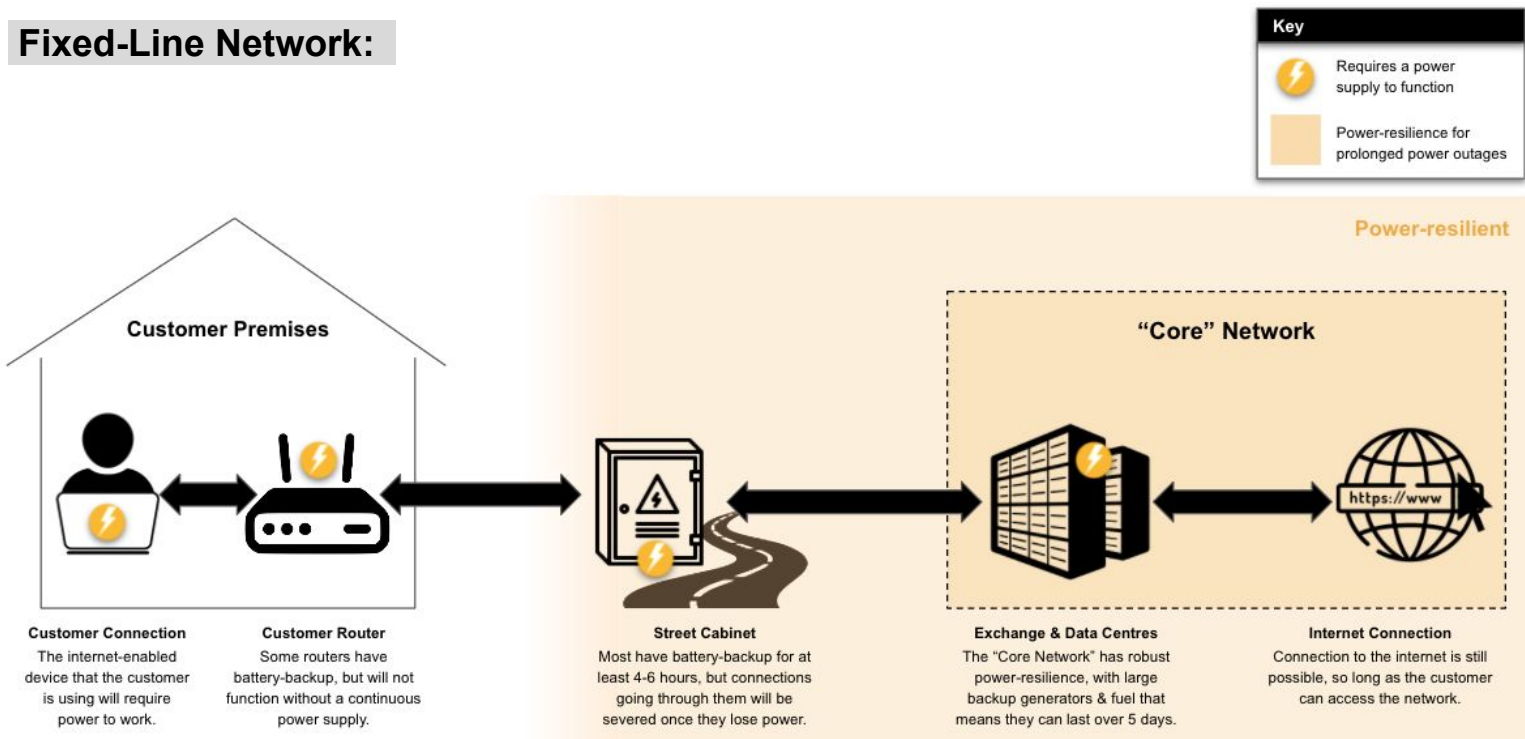
Telecommunications:
How does it all work?

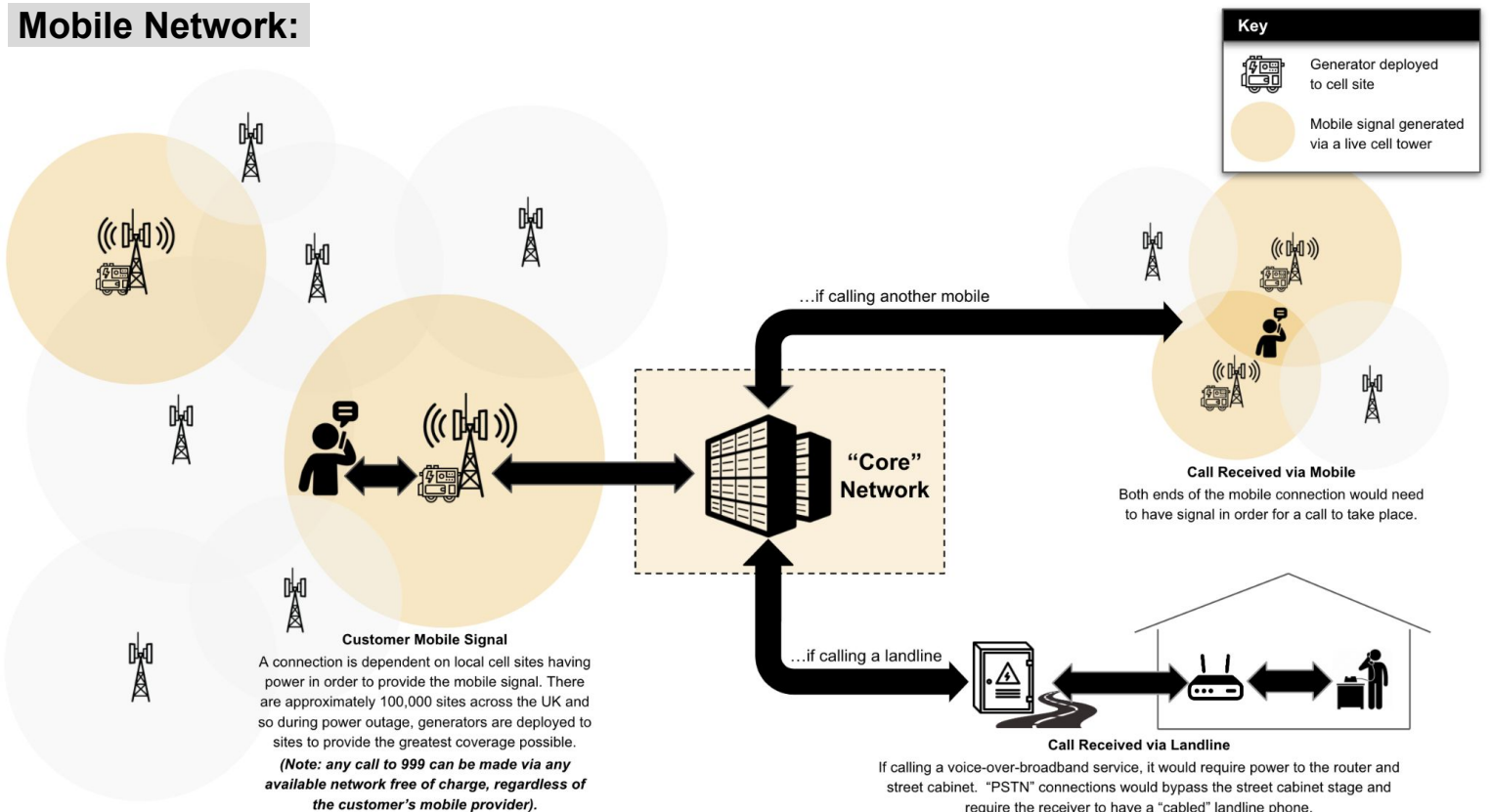## Telecommunication Networks | Two Main Forms.

There are two main forms of Telecommunication networks: **Fixed-line** and **Mobile:**

- **Fixed-line** includes all connections made via cables to the premises (e.g. landline and broadband),
- **Mobile** refers to all connections made via radio frequencies to a device (e.g. 3G, 4G etc.).

Fixed-Line Network:

Key

⚡ Requires a power supply to function

▢ Power-resilience for prolonged power outages

Power-resilient

Customer Premises

"Core" Network

https://www

Customer Connection
The internet-enabled device that the customer is using will require power to work.

Customer Router
Some routers have battery-backup, but will not function without a continuous power supply.

Street Cabinet
Most have battery-backup for at least 4-6 hours, but connections going through them will be severed once they lose power.

Exchange & Data Centres
The "Core Network" has robust power-resilience, with large backup generators & fuel that means they can last over 5 days.

Internet Connection
Connection to the internet is still possible, so long as the customer can access the network.

Mobile Network:

Key

▦ Generator deployed to cell site

▢ Mobile signal generated via a live cell tower

…if calling another mobile

Call Received via Mobile
Both ends of the mobile connection would need to have signal in order for a call to take place.

"Core" Network

Customer Mobile Signal
A connection is dependent on local cell sites having power in order to provide the mobile signal. There are approximately 100,000 sites across the UK and so during power outage, generators are deployed to sites to provide the greatest coverage possible.
(Note: any call to 999 can be made via any available network free of charge, regardless of the customer's mobile provider).

…if calling a landline

Call Received via Landline
If calling a voice-over-broadband service, it would require power to the router and street cabinet. "PSTN" connections would bypass the street cabinet stage and require the receiver to have a "cabled" landline phone.


These illustrations are purely to provide an indication of how networks function. They are **not** exhaustive or reflective of the full range and complexity of all telecommunication networks.

Overview of the Storm:

- Storm Arwen on 26-27th November 2021 brought the most significant and widespread impacts from a windstorm for several years.
- The MET Office issued Yellow wind warnings three days before the event, and Amber warnings were issued the day before the event. A red warning was issued on the morning of the 26th, giving 3 hours lead time for the first areas to be at high risk of disruption.
- Storm Arwen was the first named storm with a red warning since Storm Dennis in February 2020 (which was a red rain warning; the last time a red warning was issued for wind was Storm Gertrude in January 2016).
- The red weather impacts began at 3pm 26th of November (see map below) in Aberdeenshire before sweeping down the country into the North of England, Cumbria, Northumbria through the West side of the UK, most of Wales and into the South West.
- It resulted in three fatalities across the UK, and left almost 1 million properties without power. These power failures continued beyond 6th December 2021 for over 1,000 people in Northern England.

> **Fixed-line**, **mobile** & **broadcast** infrastructure were all impacted; poles, cables & masts damaged or disrupted leading to service failures.
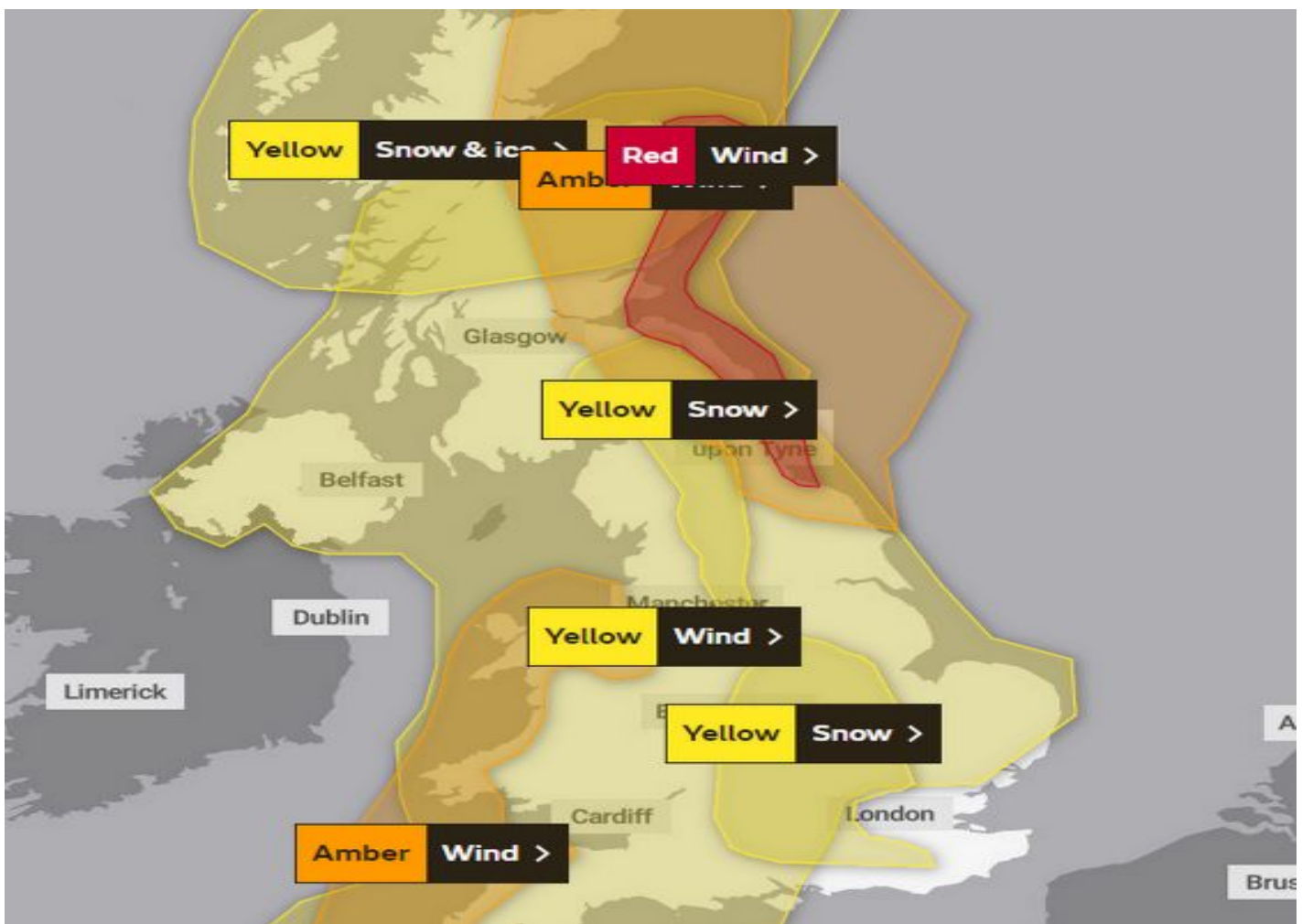
Source: MET Office Website, November 26th 2021

As the Government Department responsible for energy, the Department for Business, Energy and Industrial Strategy have published an interim report on the Storm Arwen impacts in greater detail. This can be found **here**.

Impact & Response:

- **Most customers without power, could also no longer power their router** meaning access to the internet was disabled until power was restored (even if the fixed-line connection was unaffected, or had been restored). Customers that had no power also had difficulty reporting issues to fixed-line providers.

- **The "core" network remained operational due to back-up generators providing auto fall-back power and enough fuel for up to 5 days operation** - image below illustrates the 1500+ sites running on backup generation.

- **Both copper and fibre overhead network services were impacted**, when the overhead fibre network is impacted there is generally a larger scale of customers/communities impacted.

- **The total number of dangerous damage reports received was the highest ever,** with a 600% increase in reports from members of the public - the main objective is to make these safe within 3 hours.

- **The high winds also presented extreme working conditions for immediate response**, access to many sites was blocked due to debris, there were multiple bridge closures. In some cases, specialist rock drilling equipment was required for damaged poles buried in rock. **This all resulted in protracted recovery times, leaving customers out of service for longer-than-usual timescales.**

Lessons Learned:

- **Reviewing incident management processes** and residual recovery plans where there is major engineering / infrastructure damage caused by different kinds of incidents (e.g. wind damage verses floods), and understanding how approaches should vary, and the criteria for resolution.

- **Scaling up the fibre fixed-line incident management processes**: this was the first major incident with large fibre-to-the-premises volumes. New processes are being implemented to ensure all faults relating to an incident are identified quickly.

- **Proactivity on fault identification following this kind of incident:** to determine how the identification of infrastructure issues in one area, is likely to result in other faults, and how to identify power reliant issues.

- **Proactive communications and escalations:** explore how to seek support from other fixed-line providers to manage communications, escalate to senior management appropriately and manage information issues with end-customers, as well as being more proactive on updates to Strategic Coordination Groups, Central Government and local MPs.

Top: the number of generators activated during Storm Arwen. **Bottom:** engineer photos of damaged overhead cables.

Impact & Response:

- **Thousands of mobile cell sites were disrupted** by power outages, as a consequence of the adverse weather conditions. All four Mobile Network Operators were affected.

- **Battery resilience was utilised for key sites, but was depleted after a number of hours due to the prolonged power outage;** this capability is intended to enable sites to continue operations during brief intermittent electricity outages.

- **Deployment of Tow-to-Site generators was challenging,** mainly due to the weather **conditions**, access issues, and the limited number of generator resources and suppliers. This issue was further exacerbated as estimated power restoration times were continually changing, making prioritisation and the deployment of assets to sites very difficult.

- **Temporary cell site deployments were effective providing coverage to isolated communities**; however, the sheer volume of incidents hampered the recovery effort initially due to unprecedented number of network impacts.

- **The Met office storm warnings did not provide significant advance notice of the potential storm impact areas**, which delayed the mobilisation of suppliers (e.g. mobile generators).

Lessons Learned:

- **Encourage earlier engagement with electricity providers:** following the provision of operational points-of-contact electricity distribution network operators, mobile network operators were able to provide geographic locations where restoration of electricity supply was required to support the restoration of Mobile Network coverage.

- **Trained emergency response teams proved a vital asset:** these teams allowed providers to work jointly with the electricity providers to speed recovery of strategic sites; alongside providing a form of communication between responders where mobile signal had been lost.

- **Explore options to increase power resilience for mobile sites:** this is a piece of ongoing work across the Communications Sector to improve power resilience, and avoid the loss of mobile signal in future power outages.

- **Explore the range of other capabilities:** including the use of power monitoring telemetry, additional battery backup sites, and automated weather ticketing, alongside a review of the reporting process.

- **Cooperate between all Mobile Network Operators:** there is scope to improve tow-to-site generator deployment processes to prioritise maximum coverage across all four operators.

Casey Park-Northumberland
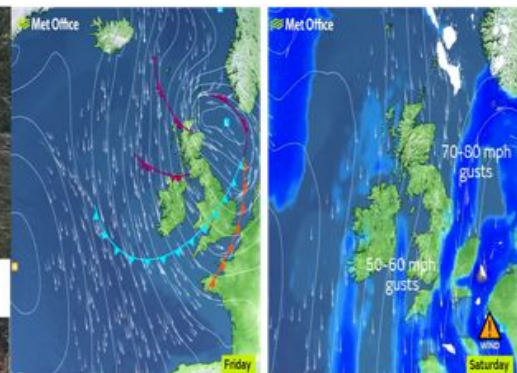
Access blocked to sites

Carkshaw Wood Cumbria

EC-RRG Action Plan:
For Future Severe Storms

Considered part of the UK's Critical National Infrastructure (CNI), the Telecommunications Sector consists of multiple fixed network & infrastructure providers, 4 Mobile Network Operators (MNO), and over 100 Communications Providers, Broadcast Providers, and Internet Providers. Given the wide range of organisations involved, **the EC-RRG has developed 12 key actions to improve the Sector's response and resilience to similar severe storms in future:**

Working **within the EC-RRG** to:

1. Review incident management processes, including the thresholds for activation of the National Emergency Alert for Telecommunications (NEAT) and Telecoms Industry Daily Information Exchange (TIDIE).
2. Explore methods to improve information exchanges between EC-RRG members during fast-paced incidents, considering the use of ResilienceDirect and other applications.
3. Develop an agreed reporting template during incidents that is appropriate for both Fixed-line & Mobile providers to enable relevant, timely, and insightful situational awareness.

Working **across the Telecommunications Sector** to:

4. Agree that any National representation for incidents is prioritised through membership of the Electronic Communications Resilience Response Group (EC-RRG).
5. Consider adopting a more strategic approach to representation, cooperation and information sharing with Category 1 & 2 responders across the UK.
6. Utilise Vulnerable Customer priority restoration processes to ensure vulnerable customers are supported.
7. Consider further communication to customers on the role and responsibilities of communication providers in advance of any future incidents.

Working **with the Power Sector** to:

8. Drive better cooperation through regular discussions with the Electronic Network Association.
9. Improve regular cross-sector communications throughout any incident of similar scale, helping to accelerate the recovery process (including through the escalation of issues, discussions about inter-dependencies, community support requirements, prioritisation of resource, and restoration of services).

Working **with Government & Ofcom** to:

10. Understand the requirements and information expected from the telecommunications sector during incidents at a National and Local level (linked to Actions **3.** and **5.**)
11. Explore the costs and challenges of making the mobile network more resilient to power outages.
12. Publish this Post-Incident Review.