NAO
National Audit Office

Report
by the Comptroller
and Auditor General

Home Office

Progress delivering the Emergency Services Network

Key facts

£9.3bn

total amount the Home Office now forecasts that the Emergency Services Network (ESN) will cost

£1.5bn

the Home Office's estimate of the current value of financial and economic benefits it now expects ESN to produce in the period from 2015 to 2037

3 years

minimum forecast delay in switching off the current Airwave system, now scheduled for December 2022

49%   increase (£3.1 billion) between the Home Office's forecast total cost of implementing ESN in 2015 and the current forecast total cost

£1.4 billion   the increase in the ESN programme budget attributable to the cost of extending Airwave

470   organisations expected to use ESN when it is ready; this includes all 107 police, fire and ambulance services in England, Scotland and Wales, and another 363 other organisations in the public, private and third sectors also expected to use the network and contribute to its costs

July 2029   month when total financial benefits are now expected to outweigh the costs that would have been incurred by continuing with Airwave, seven years later than the prediction in the 2015 business case

5 minutes   time that the Home Office expects ESN to save each police officer on each shift, compared with current arrangements (the largest economic benefit expected)

Summary

1   The Emergency Services Network (ESN) is the government's chosen option to replace the Airwave system, which 107 police, fire and ambulance services in England, Scotland and Wales (the emergency services) use for communications between control rooms and the field. Airwave is also used by some 363 other organisations, many in the public sector. ESN is intended to:

- fully replace Airwave; matching it in all respects;

- allow users to take advantage of high-speed mobile data; and

- cost less than Airwave.

2   ESN is jointly funded by the Home Office, Department of Health & Social Care, the Scottish and Welsh Governments, and by the emergency services that will ultimately use it (**Figure 1** overleaf and **Figure 2** on page 7). It is intended to save money by sharing an existing commercial 4G network, unlike Airwave, which is fully dedicated to its users. The technology being developed therefore needs to give the emergency services priority over other users of the network, in particular at times of urgent need such as major events or in crises. ESN should also allow better use of mobile data than Airwave; for example, fire service control rooms could transmit information such as live video of incidents to firefighters on their way to an incident.

3   In 2015, the Home Office awarded the three main contracts for providing ESN to:

- EE Ltd (EE) to provide priority access to its existing mobile network and increase its coverage;

- Motorola Solutions UK Ltd (Motorola) to provide software and systems that ensure ESN meets the needs of emergency services; and

- KBR Ltd (KBR) to be the Home Office's delivery partner, supporting the programme in implementing ESN.

4   Since then, the Home Office has contracted other companies to carry out work on ESN. These include Vodafone in 2016, to link ESN to emergency services' control rooms, and Samsung in 2017, to develop handheld devices for use on ESN. It has yet to award contracts for other parts of the ESN system, such as air-to-ground communications with emergency service aircraft.

Figure 1

The costs of the Emergency Services Network programme

The Home Office now expects the programme to cost £9.3 billion

Component	Responsible	Current forecast (2015–2037) Nominal (£m)
Mobile communication service	EE	1,672
User services	Motorola	1,192
Delivery partner	KBR	162
Project management	Home Office	286
Other projects	Various	2,571
Previous service (Airwave, 2015–2022)	Motorola	2,921
Contingency		714
Income from non-emergency service users		(254)
		9,264

Notes
1   Figures are taken from the financial model underlying the Home Office's current draft business case for the programme, which has not yet been approved.

2   EE, Motorola and KBR are the current main contractors to the programme. The costs shown represent the forecast total costs of these services, not necessarily the revenues to be received by the current main contractors, since these services could be provided by others when the contracts end.

3   Further information on increases in costs is in Figure 7.

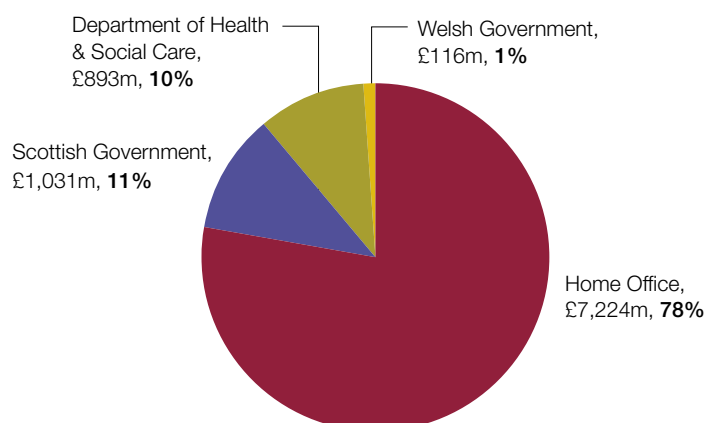Source: National Audit Office analysis of Home Office forecast

5   The Home Office previously expected that emergency services would start using ESN in September 2017, allowing Airwave to be replaced in December 2019. We reported on ESN in September 2016 and concluded that the Home Office was underrating the risks to delivering ESN successfully.[1]

1   Comptroller and Auditor General, *Upgrading emergency services communications: the Emergency Services Network*, Session 2016-17, HC 627, National Audit Office, September 2016.

Figure 2

How the Emergency Services Network programme costs are shared

The costs of building and running the programme are split between the Home Office and the other sponsors

Department of Health & Social Care, £893m, **10%**

Welsh Government, £116m, **1%**

Scottish Government, £1,031m, **11%**

Home Office, £7,224m, **78%**

Notes
1   Figures are taken from the financial model underlying the Home Office's current draft business case for the programme, which has not yet been approved.

2   Shows breakdown of the total cost of £9.3 billion. Costs falling to sponsor organisations include amounts that will be recharged to the 107 emergency services.

Source: National Audit Office analysis of Home Office forecast

6   By 2017, the Home Office realised that its plan for delivering ESN was not achievable. The Home Office was publicly reporting delays of nine months, and the Committee of Public Accounts recommended that it review the risks to the programme.[2] The Home Office commissioned an independent review, which identified five causes of delay:

- The failure of the delivery partner (KBR) to provide planning and collaboration between the other contractors after its role was downgraded.

- Motorola and EE had solutions based on different versions of the technical standards.

- Disagreement on the accountability for systems integration and technical design. The review found that the Home Office and Motorola had not agreed the "true scope" of Motorola's role in integrating ESN systems "end-to-end".

- Challenges in locking down the specification for software and user services. There was no effective process for signing off software developed by Motorola in a timely manner.

- Late delivery of the 'related projects', which the Home Office kept separate from the main contracts and controlled itself. These include the handsets and vehicle equipment that the emergency services will use, providing ESN on the London Underground and an air-to-ground service for helicopters and aeroplanes.

2   HC Committee of Public Accounts, *Upgrading emergency services communications – recall*, Fifty-second Report of Session 2016-17, HC 997, April 2017. Available at: https://publications.parliament.uk/pa/cm201617/cmselect/cmpubacc/997/997.pdf

7   In September 2018, the Home Office announced a 'reset' of its approach, based on a phased introduction of ESN services, rather than launching the whole programme at once. This involved revising the whole programme, for example to extend timetables and renegotiate contracts, a process which is still ongoing at the time of writing. This report examines what the 2018 reset means for the ESN programme and the extent to which the reset has addressed the programme's most significant risks. Our audit approach and methodology are described in Appendices One and Two.

Key findings

On the implications of the reset

8   **The Home Office decided to reset the ESN strategy while prioritising replacing Airwave as quickly as possible.** The Home Office considered that the only options available were to reset ESN or cancel it and continue to use the more costly Airwave. It decided to extend Airwave by three years to December 2022, with the option to extend further, and has addressed some fundamental issues, including adopting an incremental delivery approach (paragraph 9), replacing a key piece of technology (paragraph 13), and restructuring commercial relationships (paragraph 18). But the Home Office did not evaluate other options, because such changes would require an even longer extension of Airwave. The Home Office estimates that the total cost of providing Airwave is £1.7 million per day whereas a completed ESN would cost £0.7 million per day (paragraphs 1.14, 1.19, Figure 5 and Figure 8).

9   **The Home Office has introduced a staged approach to developing ESN intended to reduce risk and has also attempted to strengthen its management of the programme.** It aimed to reduce risk by incrementally launching discrete elements of the service for emergency services to test. This is intended to build users' confidence in the programme and allow lessons to be learned. This contrasts with the previous approach, which intended to provide a single solution all at once. The new approach will offer users the choice of a limited service from late 2019 or the full ESN system from 2021, but their appetite to adopt these early products is not yet known. Since the reset in 2018, the new programme director and team have been working to strengthen management processes, structures and information systems but this is not yet complete. This work has progressed in parallel with revising the programme's business case, negotiating new contracts with suppliers and launching the first of eight ESN products (paragraphs 1.16, 1.17, 2.2 to 2.7 and Figure 6).

10 Implementing ESN is now expected to cost £3.1 billion more than forecast in 2015, and the revised forecast costs are highly uncertain. ESN is now forecast to cost up to £9.3 billion to 2037, an increase of £3.1 billion (49%) from the 2015 business case. Of this, £1.4 billion is the cost of extending Airwave, £0.5 billion is an increase in contingency and the rest of the programme is now forecast to cost £1.2 billion more. The Home Office has delayed approving the business case for the reset until later this year, as the Infrastructure and Projects Authority recommended when it reviewed ESN in January 2019. The sponsors who part-fund ESN have expressed concerns about the cost increases and remaining uncertainties. The Home Office's costing uses assumptions that it has not had time to test with users. It includes £714 million for contingency (9% of total forecast costs) – enough to fund an extension of Airwave of less than two years if there are no other cost increases. The Home Office expects to revise its cost forecast later in 2019 (paragraphs 1.14, 1.18, 1.21, 1.23, and Figure 7).

11 The Home Office still expects that ESN will be cheaper than Airwave in the long term. The Home Office calculates that ESN will cost up to £9.3 billion, less than its estimate of £12 billion for continuing to use Airwave. Its forecast break-even point, at which total financial benefits are expected to outweigh the costs that would have been incurred without ESN, is now in July 2029. This is seven years later than forecast in the 2015 business case and is based on the programme remaining on track from this point. Total financial and economic benefits are forecast to be £1.5 billion in the period to 2037. The Home Office has not revised its assumptions for police efficiency savings made in its 2015 business case and these are yet to be accepted by police. Greater adoption of mobile technology within the police since 2015 means the impact of ESN on police productivity (the largest forecast economic benefit) may now be less than the predicted efficiency saving of five minutes per officer per shift (paragraphs 1.19, 1.20 and Figures 7, 8 and 9).[3]

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3   Numbers reflect Home Office's modelling of total costs and benefits between 2015 and the end of the modelling period. The end of the period has moved five years since the 2015 business case.

On technology risks

12   While the Home Office has made some progress, the key technology for ESN is not yet proven in real-world conditions and there are risks that parts of the system will not be available in time. Our 2016 report highlighted the significant technical challenges involved in achieving the ambitions of ESN. Some steps have been taken to prove that components of ESN are technically feasible. For example, Samsung has produced a prototype handset, and EE has successfully tested its core network's ability to prioritise emergency services' use of ESN, although this has not yet been fully tested for the ESN system as a whole or in demanding scenarios, such as major public events or disasters. Other aspects of the Home Office's plans for ESN are also based on technological solutions being available, which at present require significant work to define, develop and test, and security accreditation is not yet in place. The technology that is not yet available includes:

- how aircraft will receive an ESN signal – the Home Office will need to build a new network for aircraft and work on this has not yet started; and

- direct communication between devices (without the need for a network signal) – this is not yet supported by any device, despite being supported by telecommunications standards; the Home Office is exploring options (paragraphs 3.12, 3.28 and Figure 15).

13   The Home Office's decision to change the way the 'push-to-talk' capability in ESN is provided does not guarantee that this critical capability will be available as planned. To match Airwave, ESN must allow users to make near-instant calls at the push of a button, which is critical to the police. During development of the ESN service it became clear that Motorola's Wave 7000 'push-to-talk' product was not meeting the users' requirements. In 2017 Motorola purchased the Kodiak push-to-talk product, which is a theoretical improvement because it complies with the international telecommunication standards used by EE. However, the system still requires significant development and testing and will not meet user requirements until 2020 at the earliest (paragraphs 3.14 to 3.17 and 3.19).

14   The Home Office is not yet clear how the various elements of ESN will work together as a single, coherent system. ESN comprises multiple pieces of technology that must be made to work together. The original contracts were not sufficiently clear on who was responsible for this technical integration, and changes made since 2015 have left the Home Office with responsibility for doing and assuring this technical work. The Home Office has established a new technical working group and, at the time of writing this report, was developing plans for how it will integrate and test ESN. The Home Office does not currently have the capability it needs to fulfil this role but expects that the new contract it plans to let in mid-2019, for "programme advisory and delivery services", will include this (paragraphs 2.8 to 2.11 and 3.25).

On user take-up risks

15   The successful implementation of ESN depends on emergency services being satisfied it is an adequate replacement for Airwave, raising the risk of further delays. The engagement of users is critical to ESN's successful implementation. The Home Office will ultimately decide when to switch off Airwave. It has said it will not do so until ESN is "as good as Airwave in all respects". However, the Home Office will not mandate that anyone switch to ESN until this is achieved. The programme team has identified six major areas of concern for the emergency services. These include whether the coverage of ESN will match Airwave; whether ESN will work on the London Underground; whether the network will be as resilient as Airwave; and whether there is enough time for emergency services to integrate ESN with their control rooms. Users told us they have other concerns including whether ESN provides sufficient capacity to meet operational needs. The Home Office currently rates three of the six areas on its list red and the remainder amber (paragraph 2.12, 2.14 and Figure 12).

16   The Home Office does not yet have a coherent plan for switching off Airwave. The Home Office has developed a plan to complete ESN by the planned Airwave switch-off date of December 2022, but this contains significant uncertainty. The plan assumes ESN will be rolled out in some areas before key parts of the system, such as vehicle or aircraft devices and upgraded control rooms, become available. The emergency services consider the assumption that they can adopt ESN within 27 months unrealistic and that up to four years will be needed to address the practical challenges. The Home Office needs a better understanding of how emergency services will implement ESN in practice. In late 2018, the Home Office carried out exercises with three police forces, to examine their needs and their ability to transition from Airwave to ESN. The Home Office has now begun a wider programme of such work and expects to develop a detailed plan by autumn 2019, outlining when each emergency service will adopt ESN (paragraphs 1.21, 2.14, 2.17 and Figure 10).

17   Emergency services are concerned about the affordability of implementing ESN. Although the Home Office expects ESN to be cheaper than Airwave in the long term, the emergency services are not yet certain how much they will need to pay to invest in infrastructure to improve the coverage of ESN or to prepare control rooms to integrate with the new system. Some users are concerned that the additional costs they will need to fund will place further financial pressure on the wider range of services they must provide (paragraphs 1.7 and 2.15).

On commercial risks

18   The Home Office is taking longer than it expected to renegotiate the programme's main contracts. In mid-2018, the Home Office began negotiating interim agreements to maintain the momentum of the programme while it renegotiated detailed contract terms. This resolved some issues immediately, and project work continued throughout 2018. However, negotiations with EE and Motorola to agree the full set of contractual changes are behind schedule and the extent to which the Home Office's objectives for renegotiation will be met is unclear. According to the timetable at the start of the reset, the Home Office was to sign revised contracts with Motorola and EE by December 2018. The current estimate is May 2019. Until the scope and timescales of work are agreed and contracts are signed, the Home Office may not be able to manage suppliers effectively or hold them to account (paragraphs 3.4, 3.5 and 3.6).

19   The Home Office has not agreed who will be responsible for the ESN service once it is live. It has drafted an outline of responsibilities for supporting the ESN service as it is rolled out. During 2018, it commissioned consultants who recommended that a 'GovCo' – a government owned company – be set up to fulfil this role. But there is no detailed specification of the service that will be provided to customers, nor of the agreements between the different elements of ESN that will be needed to ensure ESN provides a coherent service that meets the needs of the emergency services (paragraphs 2.18 to 2.20).

20   The Home Office needs to manage Motorola's contractual position carefully, given that it is both a main supplier to ESN and the owner of Airwave and may therefore benefit from programme delays. Motorola owns several key components of the current and future systems for emergency services communications. It won the user services contract for ESN in 2015, purchased Airwave in 2016, and purchased Kodiak in 2017. Motorola will benefit from the successful development of ESN, but it also receives large revenues from the continued use of Airwave. The Home Office will also need to manage any conflict of interests regarding Motorola's role in accrediting products for ESN to ensure fair competition, so emergency services are not tied to Motorola's products. Motorola is a control room vendor, potential supplier of handsets and vehicle devices and in charge of accrediting devices and control rooms for ESN (paragraphs 3.7, 3.14 and 3.20).

Conclusion on value for money

21   In 2016, we highlighted both the strategic importance of the programme to introduce ESN and the high degree of risk. Ultimately, the Home Office's subsequent failure to manage these risks has led to delays in bringing the intended benefits of ESN to emergency services. The delays also mean introducing ESN is now forecast to cost £3.1 billion more than planned, and this forecast is highly uncertain. To date, the Home Office's management of this critical programme has represented poor value for money.

22 The Home Office, through its reset, has resolved only some of the issues. Its emphasis on limiting the costs of extending Airwave has meant that its plans are not sufficiently developed to give decision-makers all the information they need. The Home Office does not yet have a robust and sufficiently detailed plan that demonstrates that it understands the challenges faced by emergency services in introducing ESN, and it is also not clear how the various programme components of ESN will be integrated successfully. This lack of understanding creates a risk that poor decisions will be made and further 'resets' will be needed in future. There are still significant risks and, based on past performance, it seems unlikely that ESN can be delivered by the target date of 2022. If the Home Office is to bring this vital programme back on track and deliver the intended benefits, it must develop a comprehensive, integrated plan that addresses the significant uncertainties that remain.

Recommendations

a **The Home Office needs to test its overall programme plan, to determine whether the new schedule for launching ESN and shutting down Airwave is achievable.** It should prepare a comprehensive plan as soon as possible, covering all key elements of this complex programme, to ensure it develops realistic and tested assumptions about the time required for each element and the dependencies between them. The plan should be used to establish whether the Home Office can achieve the December 2022 date for switching off Airwave. It should be appraised by the Home Office's new supplier of "programme advisory and delivery services", expected to be appointed in mid-2019, and should be agreed by ESN's sponsors, users and suppliers.

b **The Home Office needs to decide how the vital work to integrate all the ESN technology will be carried out.** It should clearly set out whether this technical integration is part of the new contract for "programme advisory and delivery services" and if not, whether the programme team can do the technical integration itself or needs additional technical support.

c **The Home Office needs to work with other sponsors and users to develop the arrangements for managing ESN once it is fully operational.** How the ESN service will be governed and managed when it is a live service is still not clear, although we identified this risk in our report in 2016. This leads to a continuing risk that users' requirements will not be met.

d **The Home Office should develop a contingency plan that sets out what it will do if technology on which the overall ESN programme is dependent does not work.** The contingency plan should be linked to key delivery milestones for the contractors and include clear criteria for activating it.