GSMA Mobile IoT

LPWA:
ENABLING EXTREME WILDLIFE
TRACKING

Mobile IoT = **TRUSTED IoT**

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1 |SUMMARY

To protect threatened species, conservationists need to fully understand their behaviour and which habitats are key to their survival. To that end, Vodafone is working with the Sea Mammal Research Unit (SMRU) in Scotland to track the movements and health of harbour seals, which have suffered a precipitous drop in numbers in the past decade. Vodafone and the SMRU will explore the use new low power wide area (LPWA) connectivity to build up a comprehensive picture of the seals' behaviour, help understand why the population is in decline and then take remedial action. Monitors attached to the seals can use the cellular networks to feed location, activity and environmental data into SMRU scientists' computer systems.

Low power, wide area (LPWA) technologies are specifically designed to bring connectivity to millions of devices spread over large geographic areas, while minimising power consumption and the need to replace batteries. This new class of mobile technologies is set to make it much easier and more cost-effective to deploy and manage connected wildlife trackers over extended periods of time and in remote areas.

2 CONNECTIVITY FOR WILDLIFE CONSERVATION

Around the world, animals' natural habitat is under threat from development, intensive agriculture and climate change. The populations of many species are shrinking, biodiversity is reducing, food chains are being disrupted and the environment is being damaged to the detriment of animals and humans alike. There are now 41,415 species on the IUCN Red List of threatened plants, fungi and animals. More than 16,300 of these species are classified as endangered.

To save a species, conservationists need to understand how the animals behave, where they travel and which locations provide food, are suitable for breeding and other critical aspects of their lives. They can get this information by tagging the animals with connected trackers and sensors that can relay data on location and activity levels.

Once they have this data, scientists can identify which factors are crucial to the species' behaviour and build predictive models that can be used to reduce the threats the animals face.

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3 SAVING HARBOUR SEALS

In the UK, some populations of harbour seals have declined by up to 90% in the past decade. There are now just 500,000 individuals across the globe, pushing harbour seals closer to being classified as 'near threatened' on the IUCN Red List of Threatened Species.

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Bernie McConnell, Deputy Director of the SMRU

The Sea Mammal Research Unit (SMRU) in St Andrews, Scotland is trying to find out the reasons why the UK populations of harbour seals have seen such precipitous declines. It is using innovative telemetry systems to track and monitor marine mammals. "One of the things that we're discovering is that animals have very specific places they go to at sea." Bernie McConnell – Deputy Director of the SMRU, explains. "And we want to know where seals operate at sea so we can avoid disrupting those areas."

"We were the first people to put a telemetry tag on a seal back in the mid-80s," he adds. "You stick it to the seal and it'll tell you where it's going and how far it's diving. The problem with that satellite-based system though, is that we were only getting the tip of the iceberg in terms

of the data that was being collected – we could only see an approximation of where the seals were once or twice a day."
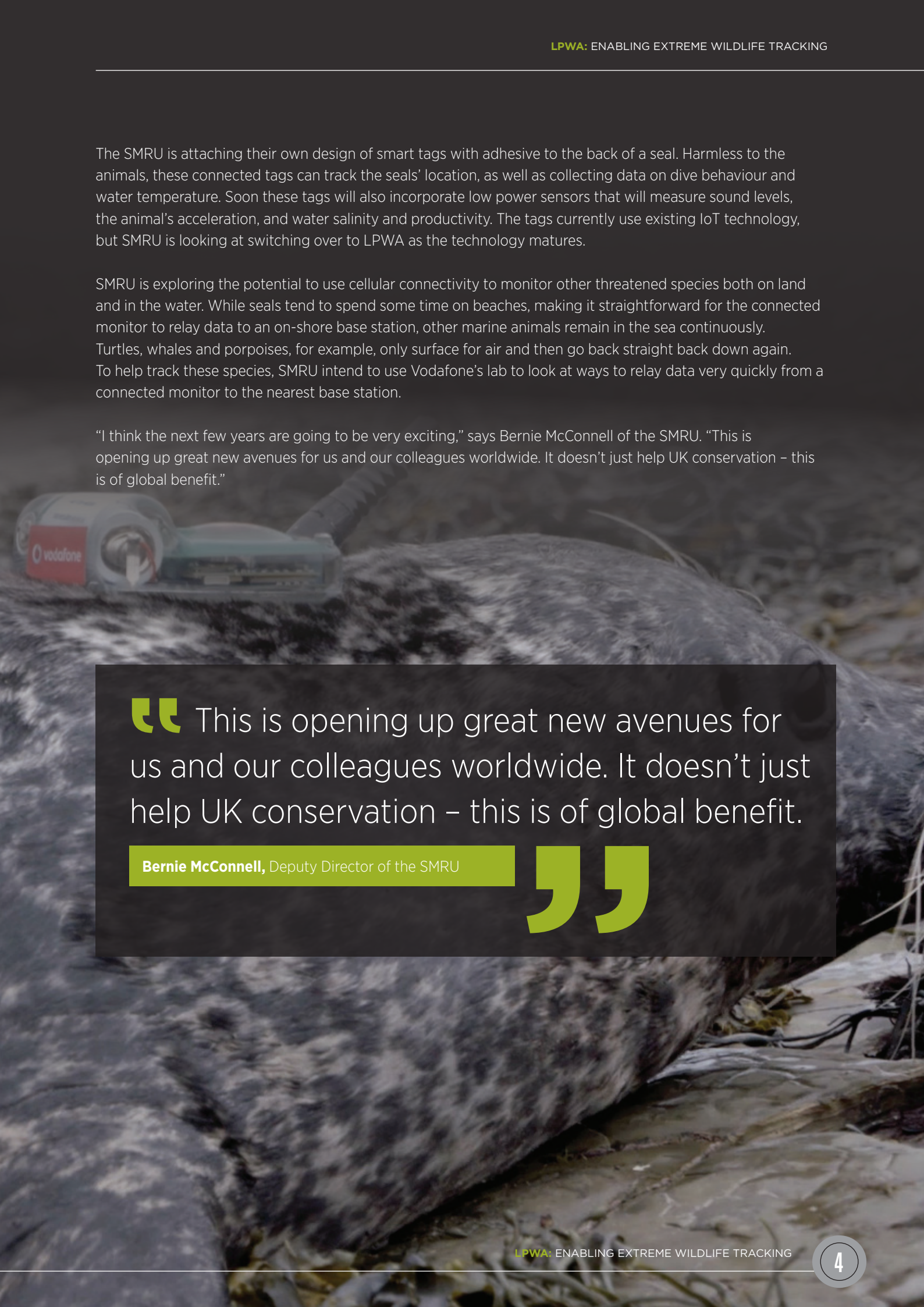
But recent advances in cellular technology will make it feasible to collect far more data over an extended period of time and over a large geographic area. Mobile operator, Vodafone, plans to provide the SMRU with access to its open lab in Newbury, England, so it can test new low power wide area (LPWA) technologies, which have the potential to allow connected devices to have a far greater battery life than those reliant on conventional cellular technologies. LPWA networks also deliver significant coverage improvements, which will enable the SMRU to track the movement of seals far out to sea.

The SMRU is attaching their own design of smart tags with adhesive to the back of a seal. Harmless to the animals, these connected tags can track the seals' location, as well as collecting data on dive behaviour and water temperature. Soon these tags will also incorporate low power sensors that will measure sound levels, the animal's acceleration, and water salinity and productivity. The tags currently use existing IoT technology, but SMRU is looking at switching over to LPWA as the technology matures.

SMRU is exploring the potential to use cellular connectivity to monitor other threatened species both on land and in the water. While seals tend to spend some time on beaches, making it straightforward for the connected monitor to relay data to an on-shore base station, other marine animals remain in the sea continuously. Turtles, whales and porpoises, for example, only surface for air and then go back straight back down again. To help track these species, SMRU intend to use Vodafone's lab to look at ways to relay data very quickly from a connected monitor to the nearest base station.

"I think the next few years are going to be very exciting," says Bernie McConnell of the SMRU. "This is opening up great new avenues for us and our colleagues worldwide. It doesn't just help UK conservation – this is of global benefit."

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4 THE IMMINENT EXPANSION OF THE INTERNET OF THINGS

Already a major player in the global machine-to-machine (M2M)[1] market, Vodafone believes newly-standardised LPWA technologies, such as Narrowband-IoT (NB-IoT), will enable a major expansion of the Internet of Things. NB-IoT has widespread support from both equipment vendors and mobile operators because it is able to support large numbers of devices cost effectively, while consuming relatively little power. Moreover, it can typically be deployed via a software upgrade to base stations using existing licensed spectrum, eliminating the risk of interference.

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Standards body 3GPP finalised the NB-IoT specification in the middle of 2016, paving the way for Vodafone and other operators to deploy commercial NB-IoT solutions in 2017.

In their trials of NB-IoT, Vodafone's engineers have been particularly impressed with its ability to provide a signal in places traditional cellular networks can't penetrate.

[1] M2M refers to the use of mobile networks to connect vehicles, appliances, machines and devices to each other and the Internet.

About the **Connected Living Programme**

The GSMA's Connected Living programme focuses on enabling a world where consumers and businesses can benefit from rich new services across many different devices – securely connected to the Internet via ubiquitous mobile networks.

The Connected Living programme's 'Mobile IoT Initiative' is designed to accelerate the commercial availability of Low Power Wide Area (LPWA) solutions in licensed spectrum. Backed by 30 of the world's leading mobile operators, OEMs, chipset, module and infrastructure companies, this Initiative will facilitate demonstrations, proofs of concept and trials of a selection of complementary LPWA licensed spectrum technologies. It will also provide analysis and feedback to assist 3GPP in standardising the technologies

For more information, visit the programme's website at www.gsma.com/connectedliving.