

Will phone calls travel by balloon?

Peter Hadfield, Tokyo

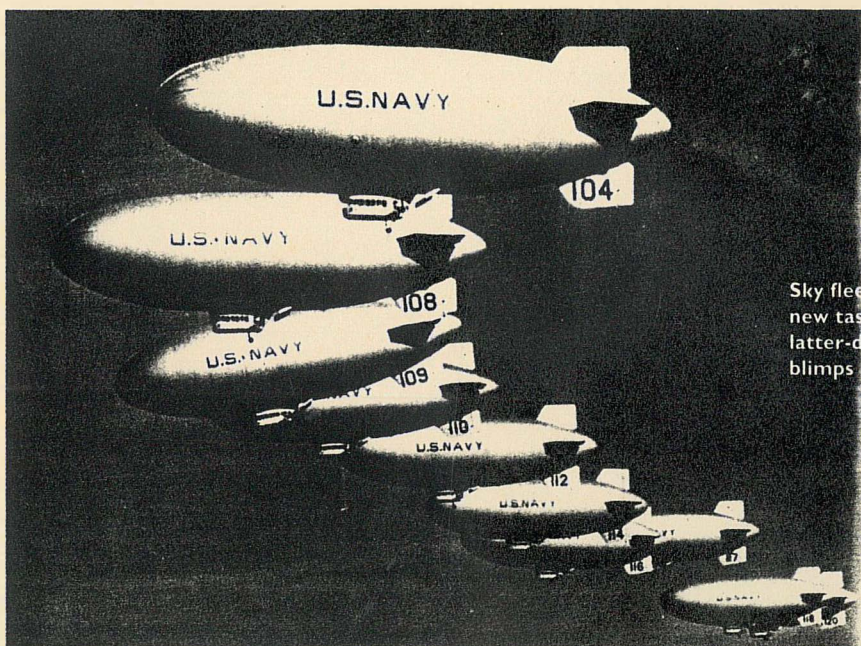
FLEETS of robotic airships made of clingfilm could soon be taking to the skies to create a global communications network.

Japanese scientists are designing helium-filled balloons that can cruise at a height of 20 000 metres and bounce mobile phone signals back to Earth. The balloons would fly far lower than the communications satellites being used for the coming generation of mobile phone systems, such as Iridium, so the phones would not need such powerful transmitters and could be smaller and lighter, says Masahiko Onda, who is in charge of the research project at Japan's state-owned Mechanical Engineering Laboratory.

Onda's team has already launched three blimps about 8 metres long. These are too small to reach 20 000 metres but were useful for testing control and recovery techniques. Spending on the project is expected to increase to £5 million this year—which will be enough to fund the launch of a 20-metre balloon.

In the lower atmosphere, warm air from the heated Earth rises through colder air, causing turbulence. But higher up the air becomes warmer and thinner, so there is less turbulence to damage the craft and shorten its life. "This means we can keep a balloon aloft for several years, manoeuvring it using onboard motors," says Onda.

The balloon will be filled with a mixture of 10 per cent helium and 90 per cent air.



Sky fleets new task: relaying latter-day blimps

At this height the difference in pressure between the inside and outside of the balloon will become so great that it could easily explode, so a valve will be fitted to regulate the pressure inside.

The balloon's skin is made from several layers of ordinary kitchen clingfilm coated with polythene. Clingfilm was chosen for its low gas permeability.

The final version of the balloon will be solar-powered, since it will spend most of

its time above the clouds. At night it will use batteries that will be recharged during the day. It could also be powered by microwaves beamed up from the ground.

The first commercial airships could be built for the Californian company, Sky Station, which wants to launch balloons as part of a worldwide mobile phone network.

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Cellphone tests aim to bridge the Atlantic

ONE OF Britain's main cellphone operators is planning to experiment with a method of cramming ten times as many subscribers onto its mobile phone network. If Vodafone's trials are successful, it may become possible to use the same mobile phone on both sides of the Atlantic.

Vodafone currently supports two different

mobile phone standards on its network. The older is the analogue Total Access Communications System (TACS), which dates from the 1980s. The other is the digital Global System for Mobile (GSM), which is widely used in Europe and elsewhere, but not in the US.

TACS and GSM treat phone conversations differently. TACS carries each one on its own radio channel, 25 kilohertz wide. In contrast, GSM converts speech into digital code, chops it into packets and then weaves packets from different conversations onto a single radio frequency. The receiver puts the conversation back together. The natural spaces between words allow at least eight speech channels to be carried on a single GSM radio channel 200 kilohertz wide.


Now Vodafone is experimenting with an American mobile phone standard called Code Division Multiple Access (CDMA), which was originally developed for the military. Packets are not interwoven as in GSM but preserved as a continuous stream and transmitted in the same 200-kilohertz channel. Conversations create a

mix of digital code which resembles random noise. But at the start of each call the receiver and transmitter give signal and identifying label. This lets the receiver pick out the correct conversation. CDMA can cram up to ten times as many speech channels as GSM into the same frequency space.

Vodafone wants to find out if all three standards can coexist on one network, so avoid the need to build new base stations for CDMA phones. The trials will run towards the end of the year with Qualcomm of San Diego, which owns key patents. Vodafone announced the trials last week at a summit meeting of cellphone operators held in Fiji. In the same week the British government unveiled a bill which will charge higher licence fees for services that squander frequencies.

The results of the tests will be reported on to the European Telecommunications Standards Institute and the International Telecommunications Union GSM Association, Vodafone says. If it works with GSM, a hybrid system is proposed as a third-generation cellular standard for Europe.

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