

Why are US allies building their own global positioning system? Call it a declaration of independence.

By Oliver Morton

In December 2001, a letter from Washington arrived at the 15 defense ministries of the European Union. The writer was Paul Wolfowitz, the forthright and hawkish US deputy secretary of defense; the subject was a European satellite system called Galileo; and the tone was far from happy.

A planned fleet of 30 satellites dedicated to the broadcast of positioning data, Galileo promises to be an updated European equivalent to the familiar US Global Positioning System, whose signals allow everyone from muddled drivers to overnight hikers to pinpoint their location. Beginning in 2008, Galileo will supplement and improve on the accuracy of existing GPS satellites, serving consumers around the world. In short, Europeans will pay for a new network, while Americans, who use satellite positioning services more than most, will benefit.



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To Wolfowitz, though, and to many others in the United States, there is more to it than that. GPS is not just a convenience to consumers. It is also a crucial element of US military power, enabling new forms of precision warfare — like guided bombs and, in the future, individual guided shells. Currently, the US decides what nations use the military GPS signals; the US determines whether civilian signals should be jammed if unfriendly powers try to use them for threatening purposes; and the US dominates the industry that makes the related equipment. Galileo would end this monopoly. It would encourage the establishment of new location-based services outside the United States. It would open up the possibility of outside parties using precision weapons for purposes that undermine US foreign policy. It could

even, conceivably, lead to satellite navigation being used directly against the US.

Not all of these issues were mentioned in Wolfowitz's letter, which was promptly leaked to the press. His missive focused on the nitty-gritty, warning that Galileo's signals — which will be transmitted on frequencies similar to those of GPS so that the same receivers can use both - could interfere with new military signals to be introduced by the US beginning in 2003. While he was careful to mention only military issues for which various technical fixes are under discussion, Wolfowitz was widely seen as encouraging Europe to oppose the project entirely. "It was an attempt at sabotage," one European official maintains.

If so, it didn't work. Wolfowitz's displeasure may in fact have heightened Galileo's appeal. The deputy secretary's hard-line stance on the Middle East, combined with his tendency to exclude European officials from Pentagon thinking, does not play well in the EU. According to Charles Grant, head of a think tank called the Centre for European Reform, the general European view of Wolfowitz is "unprintable."

In the spring, despite further American protestations and uncertainty over who would foot Galileo's 3.6 billion euro (\$3.2 billion) bill, Europe's heads of government officially approved the project. Proponents heralded the benefits to consumers and the stimulus to

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business, but for many European leaders, the main argument for Galileo was, and still is, a single truth at the heart of US opposition to it: GPS is a solely American possession. With Galileo, the EU is saying this technology is too critical to be controlled by a foreign power.

To understand Europe's insistence on building Galileo, it's important to consider first an influential report, written in 2000, on the future of European space policy. Commonly called the Bildt report (it was coauthored by Carl Bildt, the former prime minister of Sweden and chair of the Dayton peace process; Jean Peyrelevade, chair of Credit Lyonnais; and Lothar Späth, a German industrialist and politician), its key conclusion was this: "The driver of [a common] European Space Policy is to make Europe not dependent on non-European space infrastructure for any strategic and commercial applications associated to space systems." The inelegant double negative is a mild-mannered but firm declaration of independence.

Europe already has its own launchers and communications satellites (the development of which the US tried to stymie in the 1970s), and in recent years, Germany and Italy have increased efforts to develop satellites for military reconnaissance. Galileo represents the same assertion of independence with regard to positioning systems.

The drive for autonomy is rooted in the idea that space is an essential part of a nation's infrastructure in the 21st century — as railways were in the 19th century and roads and power grids were in the 20th. Such vital infrastructure is not something states entrust to outsiders. Positioning services, European officials believe, will be indispensable — for improved air traffic control, intelligent highway systems, and a range of commercial activities. They have come to fit into the category of infrastructure that a state — or a union of states, in this case — needs to look after for itself.

Europe is not a superpower mainly because its people don't want to spend the money necessary to become one. But it is not willing to give up the possibility of military, political, and commercial autonomy. Failing to build an independent positioning infrastructure would mean surrendering that goal and submitting to what French president Jacques Chirac calls the "vassal status" of Europe.

If there are hazy political and emotional arguments for Europe being the world's second source for navigation systems, the commercial arguments are more plain. Businesses serving farmers, surveyors, pilots, shippers, and travelers of all kinds will increasingly exploit the existing US technology. With the addition of Galileo — and 54 rather than 24 satellites in the sky — Europeans believe redundancy and improved reliability for anyone with a receiver will further drive the market.

Galileo will also generate revenue through perks that GPS doesn't offer: a sort of "we're number two so we try harder" design. While all its users will receive free high-precision signals, paying customers will have access to encrypted, real-time monitoring of the system's performance; "integrity" messages will warn them of glitches in timing, errors in the satellites' positions, and anything else that might affect accuracy. (For cases where lives are at risk, such as navigation in the air or at sea, this extra will be free.)

The European Commission, the EU's executive agency in Brussels, expects Galileo to earn hundreds of millions of euros each year through such services. It also foresees a boom in equipment sales, fed in good measure by European producers. The world market for satellite positioning receivers is dominated by US companies in part because GPS know-how has been a largely American resource. Galileo, the commission hopes, will

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help build Europe's expertise and turn its companies into competitive hardware and service providers for a joint GPS-Galileo market.

From the US perspective, none of this looks good. Trade relations across the Atlantic are hardly at their most cordial. Europe is irritated by new US tariffs on steel and increased farm subsidies (in the latter case with the peculiar irritation of pots encountering black kettles). The United States is angry about Europe's insistence that genetically modified food be labeled as such (which is seen as a dastardly way of discouraging Europeans from buying it). Against this background of mistrust, the US fears that the EU will find ways to make Galileo the preferred or even obligatory supplier for some applications - for the signal and hardware to charge drivers on toll roads, for instance - and to concoct insidious nontariff barriers that keep out US manufacturers. Thus subsidized, European manufacturers would eat into markets overseas. Needless to say, Brussels denies any such plans.

The United States' other near-term worries are at the core of the Wolfowitz letter. At issue is one of the frequency bands assigned to GPS. The central part of this band is currently used for both civilian and military GPS signals. In the future, though, a new military signal called M-code will be broadcast in two parts at the edges of the band, thus making it easier for the US to jam the open-access civilian signals in the middle without degrading its own military service.

The problem is that the GPS band is bracketed by two smaller ones, E1 and E2, which were assigned to Galileo at the World Radio communication Conference in 2000 and on which Galileo will broadcast its Public Regulated Service for official safety uses. This raises two issues for the Pentagon. One is that the Galileo signal on E1 and E2 might interfere with the M-code transmissions, though European analysts say that it won't. The other concern involves jamming. The US doesn't want third parties using positioning signals against its forces; that's why the Pentagon can jam its own civilian transmissions, and why it wants the ability to block Galileo's. But jamming signals in E1 and E2 might risk obstructing the M-code signal.

This hitch is particularly contentious because of the specific signal Europe has chosen to broadcast over E1 and E2. The Public Regulated Service will be used exclusively by governments, and while other Galileo signals may be withdrawn in times of crisis, the encrypted public service is designed to be always on. Although Galileo is not a military program, the regulated signals clearly have the potential for military use - that much is acknowledged by the fact that their receivers will be subject to export controls as "dual use" technologies. For someone with a suspicious mind, putting the encrypted signal onto the E1 and E2 bands, where it can hide in the M-code's skirts, looks like a way to make it unjammable.

Tony Pratt, a member of the commission's Galileo frequency working group and an adviser to the British government, says that Britain and much of the rest of the EU want to see the Public Regulated Service as far from the M-code as feasible. Even with such good will, though, jamming the public encrypted signals will require a sophisticated and expensive strategy for the US, since part of the M-code signal slops over onto E1 and E2. According to Keith McDonald of Navtech Consultants, who was scientific director for the Pentagon's satellite navigation programs in the early days of GPS, the Pentagon is talking about a price as high as \$3 billion for the capability to jam Galileo - almost as

much as the cost of the system to begin with - and a fair part of that would probably be spent on the technical difficulties of blocking the E1 and E2 bands.

It's not hard to see that this would be galling to the Pentagon. The United States spends a lot of time arguing with its European allies about their relatively paltry spending on defense; now here they are, spending lavishly on something for which they have no military need and which will cost the US billions in the bargain. And although Galileo isn't designed to be a military system, it could become one, just as a nation's roads and railways can become means of dispersing troops.

For Europe, the strategic benefits of building Galileo may not be realized for decades, if ever. So why build it now? Two reasons. One is that doing it later, when there might already be significant military disagreements across the Atlantic, could be even more provocative than embarking on the project today. The other is that the EU has a commercial window of opportunity. In 10 years or so, the US will launch a new generation of GPS satellites that may well offer civilian users a service as good as or better than Galileo's, making the market far harder to crack. The chance to get a nice economic boost, and at the same time buy a degree of strategic autonomy, will not be available for long.

So the EU is forging ahead — despite the fact that GPS services are already accessible to its citizens and, via NATO, to most of its armed forces; despite the fact that the US is deeply suspicious of the idea; despite the findings of a PricewaterhouseCoopers assessment that private industry isn't likely to foot its half of the project's 3.6 billion euro bill (so far, finance ministers have pledged more than 1 billion euros from public coffers); and despite the fact that there are plenty of other things on which European governments could blow those euros.

WHY NOW? BECAUSE IN 10 YEARS, TRANSATLANTIC TENSIONS MAY BE WORSE.

Whether the commercial returns the EU hopes to reap from its monster investment will materialize is unknown, yet experience suggests it's a good bet. Europe's decision not to cede the large airliner market to the US has given it Airbus, which this year threatens to overtake Boeing in market share of commercial jets. Its decision to start building its own launchers in the early 1970s — a time when the United States was aggressively lobbying the non-Soviet world to use its cheaper space shuttle for satellite launches — produced Ariane, now the most widely used commercial launch system in the world.

True, Ariane has never been a great business. Currently it is losing money, not least because of increasing competition from American manufacturers. But it illustrates a larger lesson that applies tellingly to Galileo. The benefits of Europe developing an independent launch system in Ariane have been felt around the world. When the space shuttle fleet was grounded after the *Challenger* accident in 1986 and then stopped taking commercial business, Ariane provided the satellite industry's only alternative — and gave American companies a way to launch payloads that would otherwise have been stuck on Earth. The United States may not want to lose its monopoly on satellite positioning signals, but in the long run, an arrangement in which the entire world depends on a single, monolithic technology can't be a wise one.

Contributing editor Oliver Morton (oliver@pop.dial.pipex.com) wrote about strategic defense in Wired 9.12.