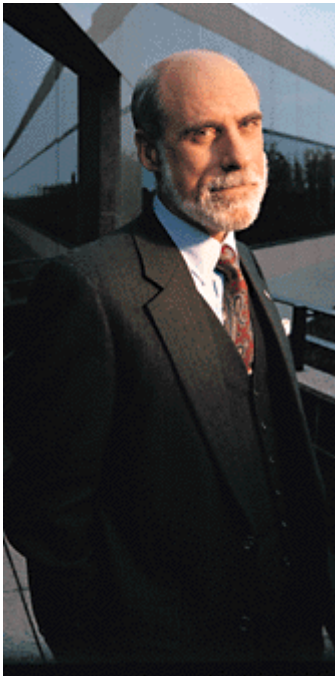


[Dec. 15, 1999/Jan. 1 2000](#) Issue of [CIO Magazine](#)

From *Inventing the Enterprise*

Vinton G. Cerf

INSPIRATION Vinton Cerf was a graduate student at UCLA in 1969 when a government contractor, Bolt Beranek Newman (BBN; now GTE Internetworking Inc.), built and delivered the first node of a new government/research network to the university—the Internet.



It was the first time anyone had successfully demonstrated that packet-switching—the quick delivery of small, discrete data bundles over telephone lines—worked on a wide area network. It was also the beginning of ARPAnet, the agency's network, and a movement to allow the various research centers in government (specifically, Defense) and universities to be able to share data easily without having to revamp their computer systems.

Cerf had graduated and was working at Stanford University in 1973 when Robert Kahn, a former BBN employee who had moved over to DARPA after the UCLA demonstration, came to visit. "We talked about these various networks he was working on and how to get them to communicate over heterogeneous systems and about interconnecting multiple packet networks," Cerf relates. The pair began tackling the problem. "The principal motivation was how to let people do computer science

THEN
Codeveloper,
TCP/IP, 1973,
DARPA

NOW

Senior vice president of internet architecture and technology, MCI Worldcom, Washington, D.C.

more readily," says Cerf. "We had to overcome the heterogeneity of computers with different operating systems needing to communicate."

INNOVATION Kahn and Cerf completed an initial design document, which they presented informally at a conference and then published the next year, 1974, in an IEEE publication.

"As far as networking was concerned, 1974 was an amazing year," Cerf recalls. "That was the year a team of graduate students and others, some from Xerox PARC, participated in a more detailed design of the idea that we had published in May. That was really the beginning of TCP." The connection-oriented transmission control protocol was designed to provide reliable communication and multiplexing; the Internet protocol provided packet routing. The result: TCP/IP.

IMPACT After eight years of new iterations, testing and implementation, DARPA set a deadline for switching from ARPAnet to Internet architecture, and in 1983 TCP/IP was finally rolled out to ARPAnet and all networks attached to it. For his part, Cerf thought the work was done. "I didn't really see a commercial potential for all this until 1984," he says. "That was the year [Internet router provider] Cisco [Systems Inc.] was founded. I was impressed that someone would take it up as a commercial endeavor."

INSIGHT "The Internet has become a substrate for all other communications," says Cerf. "By 1990 it was becoming clearer it could be viable commercially, but I don't think any of us had

The Inventors:

- [Bell](#) — [Berners-Lee](#) — [Bricklin](#)
- Cerf —
- [Estridge](#) —
- [Gosling](#) —
- [Metcalf](#) —
- [Patterson](#) —
- [Ozzie](#) — [Ritchie](#)
- [Hopper](#) —
- [Missing In Action](#)

any idea of how far it would go."

Cerf sees interactive Internet radio and television just around the corner and envisions a whole range of Internet applications that haven't yet been dreamed of—including Internet-enabled refrigerators, bathroom scales and even an interplanetary Internet. "Think of it this way," Cerf says. "ARPAnet is a network of computers. The Internet is a network of networks. An interplanetary net would be a network of Internets." The sky's the limit. (For more on Vinton Cerf, visit www.wcom.com/about_the_company/cerfs_up.)



Photo by Katherine Lambert

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CIO Magazine - Dec. 15, 1999/Jan. 1, 2000
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www.knighthood for publicity-shy inventor of the world wide web

By Paul Waugh and Charles Arthur 31 December 2003

Tim Berners-Lee, the publicity-shy physicist who invented the world wide web, has been awarded a knighthood.

An unsung hero of the modern age, Mr Berners-Lee is named in today's New Year's Honours List for "services to the internet" - creating the system that has revolutionised computer use across the globe.

The system, which he devised in his spare time in 1991 while working as a researcher at the European particle research laboratory Cern, features billions of web pages used by hundreds of millions of people every day.

Crucially, Mr Berners-Lee gave his invention away rather than trying to patent or restrict its use, making it possible for the web to grow at a rate never seen. Without his creation, there would be no "www" computer addresses, and the internet might still be the exclusive domain of a handful of computer experts.

In typically modest fashion, the 48-year-old Briton was at pains yesterday to point out that he did not invent the internet itself, but instead devised a method for more easily accessing what was there.

"I'm very honoured, although it still feels strange. I feel like quite an ordinary person and so the good news is that it does happen to ordinary people who work on things that happen to work out, like the web," he said.

Mr Berners-Lee is one of the least glitzy names in an honours list shot through with New Labour's characteristic emphasis on pop, sport and celebrity. There are CBEs for Ray Davies of The Kinks; Stephen Daldry, the director of Billy Elliot; the rock star Eric Clapton; and the best-selling children's author Philip Pullman.

As in recent years, there is a strong political emphasis on public services, with knighthoods for teachers who turned around failing schools, and CBEs for nurses, cancer specialists and others in the NHS.

An MBE was given to Inspector Paul Cahill, the chairman of the Gay Police Association, for helping to modernise attitudes within the police force.

The entire England rugby team is honoured for its World Cup victory, with a knighthood for Clive Woodward, the head coach. Martin Johnson, the captain, is made a CBE and Jonny Wilkinson an OBE.

Among the foreign and diplomatic list, one of the most interesting awards is a CMG to Alastair Crooke, the MI6 agent who acted as a link man between militant Palestinians and the Israeli Government. Harold Evans, a former editor of The Times, is knighted.

The list comprises 981 names, of which 480 or 47 per cent are nominated by members of the public, slightly down on last year. Services to the community, including police and local councils, make up 30 per cent of the total, by far the biggest proportion. Business and science make up 20 per cent, education and health 10 per cent each, the arts 8 per cent and sport 7 per cent.

This year's list has attracted unprecedented attention because of leaked Cabinet Office documents revealing how honours are awarded. As predicted, Tim Henman, whom civil servants said would "add interest" to the list, is granted an OBE. Similarly, Simon Jenkins, The Times columnist whom officials said would add gravitas, is knighted. Colin Blakemore, the neuroscientist who was considered too controversial for an honour, is not included.

The leaks also showed how many people in public life had rejected honours they deemed old fashioned and linked to the former British empire. Among those who turned down awards were David Bowie, Nigella Lawson and David Hockney.

A review of the system is under way to overhaul the secrecy and selection methods of those suitable for awards. Tony Blair's spokeswoman said: "It is important to achieve greater transparency and a greater independent input."

The knighthood for Mr Berners-Lee will help to restore the credibility of the system. Although he could have made a personal fortune in the private sector, he earns an academic salary as the head of the World Wide Web Consortium (W3C) at the Massachusetts Institute of Technology in Boston.

"To a certain extent it's an acknowledgement of the profession as well, that it's useful and creditable and not a passing trend. There was a time when people felt the internet was another world, but now people realise it's a tool that we use in this world," Mr Berners-Lee said yesterday.

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