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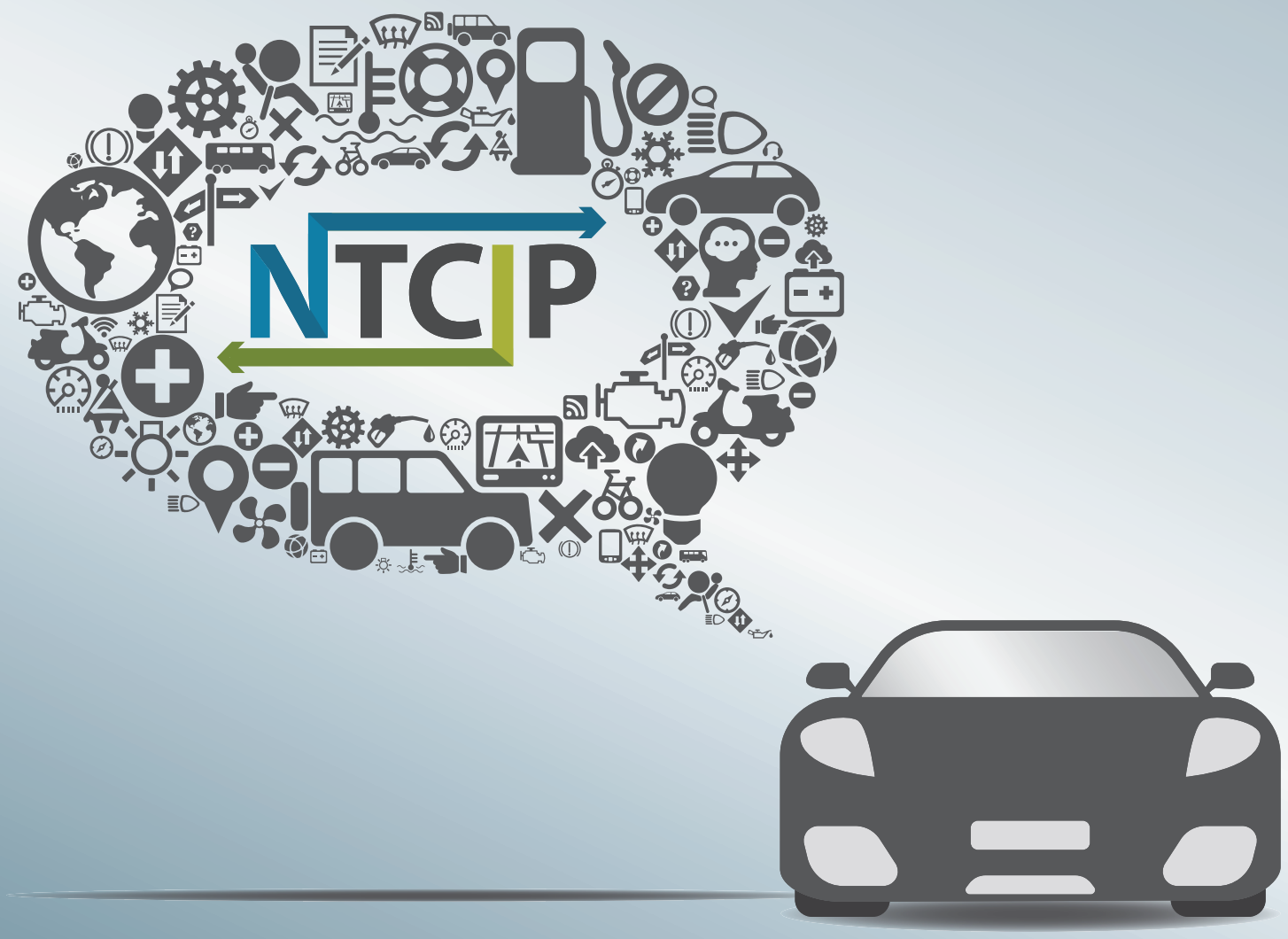

THE GREAT DEBATE

Can NTCIP do the job? p. 6

the great debate

By Pete Goldin

There is a movement in some quarters of the ITS community to push NTCIP as the national standard for traffic data communication, but many officials wonder if NTCIP can do the job. There is little consensus and little progress as the debate over NTCIP continues.

The National Transportation Communications for ITS Protocol (NTCIP) is a family of standards that defines protocols and profiles that are open, consensus-based data communications standards. NTCIP is meant to provide interoperability and interchangeability for transportation management devices, and established standards can facilitate transportation center or agency coordination and information sharing. Whether NTCIP has accomplished these goals remains a matter of debate in the transportation industry.

NTCIP was initiated more than 20 years ago as a joint standardization project of the National Electronics Manufacturers Association (NEMA), the American Association of State Highway and Transportation Officials (AASHTO), and the Institute of Transportation Engineers (ITE), with funding from the Research and Innovative Technology Administration's ITS Joint Program Office within the US Department of Transportation. While USDOT still stands firmly behind NTCIP, some local transportation agencies question the standard's effectiveness, and the debate continues today.

Interoperability and Interchangeability

The reasons behind NTCIP are best explained in The NTCIP Guide: "The transportation industry has had a history of deploying systems with unique data definitions and proprietary communications protocols. Field devices and systems from one manufacturer or developer were not interoperable with those of other manufacturers or developers. As a result, expansion of the system after initial deployment can generally only be done using equipment of the same type and usually the same brand as in the initial deployment, unless there are investments in major systems integration efforts."

The guide continues: "With proprietary protocols, there is little to no opportunity for realistic competitive bidding as additional field devices are added to the system, due to the lack of interchangeability. Nor is there any opportunity for realistic competitive bidding to add additional types of field devices to the system, due to the lack of interoperability."

Interoperability and interchangeability are two key goals of the NTCIP. Interoperability means the ability for systems and devices from multiple vendors to exchange information; interchangeability means to actually exchange devices in the system with similar devices from other vendors.

"USDOT encourages use of NTCIP standards to enhance agency operations — e.g. planned and unplanned events, normal operations — by increasing interoperability," according to USDOT. "Interoperable systems allow state and local agencies to communicate seamlessly."

USDOT believes using NTCIP standards results in a more competitive

marketplace, which they claim can lower both initial and lifecycle costs of ITS systems and provide the flexibility to competitively procure replacement parts and additional system components rather than being tied to a specific vendor's products. "Procuring standards-based systems allows a building-block approach to expand ITS systems across communities without being tied to a single vendor's proprietary system," the USDOT continues.

While this may be true in some ITS device markets, such as dynamic or variable message signs, some local agencies reveal that this is not always the case. Shawn Gotfredson, a senior civil engineer for Overland Park, Kansas, notes that NTCIP-compliant field devices and central systems do not necessarily mean that those devices and systems are truly interoperable and interchangeable.

"From what I understand, NTCIP was supposed to allow us to use devices from different vendors, and they would be interchangeable with NTCIP," Gotfredson says. "That was the hope, but that is not exactly what we saw in field implementation. NTCIP seems to work well for basic parameters, but when you go past that, every manufacturer has proprietary objects, so there is no real interchangeability."

Fred Koehler agrees. Koehler is project manager for Third Coast Services; from 2001 to 2012, he served as traffic operations manager for Montgomery County, Texas. "Our traffic signal timers claimed to be NTCIP compliant," he says. "That means that if I wanted to go to a different central system software, I can talk to their timers? Well, not really." Koehler says they could get some, but not all, of the information out of them, because even though they were NTCIP compliant, some parts were still proprietary.

"None of the products I used were truly NTCIP compliant," he adds. "It was not a universal language."

"On the traffic signal controller side, we had hiccups," recalls Joerg "Nu" Rosenbohm, CTO of ITS America, who worked on NTCIP for 17 years and was the primary author of several NTCIP standards. "Vendors would say that their equipment was NTCIP compliant, but they were utilizing different options within the standard. Because of these different options, they turned out not to be interoperable. They still claim NTCIP compliance because they comply with the standard, but the specifications were not strict enough to enforce the same functions in the exact same way for the field devices. That created a problem with achieving the overall goal of NTCIP, which is interoperability and interchangeability. I think we are getting better at that."

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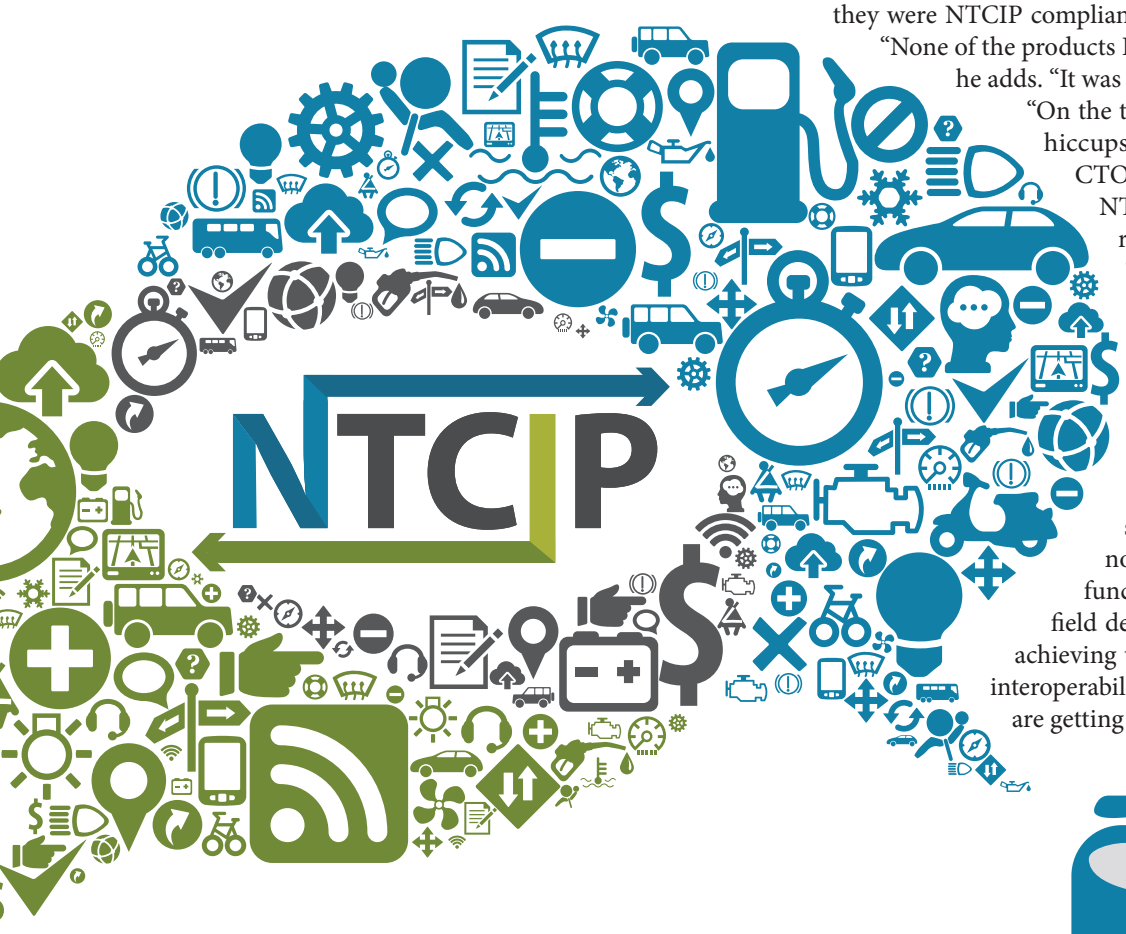
>
> — *THE NTCIP GUIDE, USDOT*



The NTCIP Challenge

In addition to the issues about interoperability and interchangeability, some agencies have faced other challenges with NTCIP.

"NTCIP was not as well defined as it could have been, and as a standard for traffic signal control, NTCIP was difficult to implement," says Gotfredson. "NTCIP communications between our field devices and central system weren't as fast as we hoped. The new NTCIP compliant system is slower than our older system, and it is my understanding that NTCIP overhead causes those delays."

> "I gave up on NTCIP. It is hard to understand . . . [and] so vague in some spots . . . it was really useless to the rest of us."
>
> — *FRED KOEHLER, PROJECT MANAGER , THIRD COAST SERVICES*

"I gave up on NTCIP," Koehler agrees. "It is hard to understand, unless you are an engineer. NTCIP was so vague in some spots, and where it was specific it was really useless to the rest of us that were just trying to get something done. I never saw the benefit of NTCIP in our world, at the local level."

As an example, Koehler says the NTCIP architecture prescribed center-to-center communications and data sharing. "Exactly what do we need? What is it going to require? What do they mean by center-to-center communications?" he continues. "I had a direct fiber link to Houston Transtar. I could not talk to them, but because I had this piece of fiber that got our two networks together, I was compliant. In my mind that was useless."

In the end, Koehler says it came down to costs. "We had a shoestring budget, we had to do our projects cheap," he says. "That is the main reason I decided not even to worry about whether I was NTCIP compliant. Instead of deploying a $10,000 NTCIP compliant camera, I put up a CCTV camera that was one-tenth the cost."

Of course, some of NTCIP's challenges relate to communicating the standards to users, problems that arose in the early days of the NTCIP development. "The main challenge of NTCIP is that a great deal of the conception and development work was done without first thoroughly gathering user requirements and putting clear principles of operations in place," says Rick Weiland, who worked as Weiland Consulting from 1998 to 2004. "USDOT imposed a systems engineering process after the fact, but in my view, it was never very effectively adapted to the service of standards development, and it didn't work very well. NTCIP was not as coherent or consistent a set of standards as it could or should have been, and the process for completing NTCIP has taken far longer than it should have, even on a standards time scale which is sometimes characterized as glacial."

NTCIP Evolution

According to Nu Rosenbohm, it took USDOT a decade and a half to actually come up with a set of standards that allow agencies to easily specify what they are looking for on a field-device-type by field-device-type basis. "In terms of backlash against NTCIP, interoperability was questioned very early on," he says. "The biggest problems came out of the traffic signal controller environment. If we develop a set of standards for interoperability and interchangeability, and the market is not getting that, we lose our credibility. We obviously have to overcome that. That is the reason why most of the NTCIP standards are now in version two or version three, in order to overcome these initial interoperability problems."

Rosenbohm says the organizations involved in NTCIP development continue to work to improve the standards and solve these challenges, as well as better educate transportation agencies and consultants about how to utilize NTCIP.

"Like any other standards, the NTCIP family of standards can always be improved," a USDOT official says. "These standards will continue to evolve to meet stakeholder needs and account for technological advancement both through the independent actions of the standards working groups."

Over the last few years, a Requirements Traceability Matrix (RTM) has been developed for some NTCIP standards, and Rosenbohm says this makes it much easier for a procuring agency to identify the functionality they need or desire. "People that are deploying or supplying equipment could actually reply using the RTM to show how they are supporting the requirements for the purchasing agency," he says.

To Mandate or Not To Mandate

Possibly because NTCIP is a voluntary standard, it has seen inconsistent market penetration across ITS devices in the US. USDOT does not maintain specific statistics on NTCIP market penetration, so it is difficult to confirm the exact numbers.

"Penetration of NTCIP is different for different field devices," says Rosenbohm. "For example, on variable message signs you cannot find a single vendor in the US market that does not use NTCIP. Everybody uses it."

> "Mandatory standards, particularly in technology realms, always risk bringing forward-progress to a halt."
>
> — *RICK WEILAND, WEILAND CONSULTING*

For other devices, such as traffic signal controllers, traffic cameras and vehicle detectors, NTCIP has not caught on as fast. However, Rosenbohm notes that the ITS industry continues to see more and more devices that are NTCIP compliant. For now, the official stance continues to be that NTCIP participation will remain voluntary.

"While USDOT encourages use of standards-based Intelligent Transportation Systems, there is currently no plan to mandate any of the standards from the NTCIP suite," according to USDOT. "The NTCIP family is a broad suite of standards covering both field equipment control communications and center-to-center communications. State and local governments should be allowed the flexibility to procure those systems which best integrate with their existing ITS infrastructures and otherwise fully meet their needs in the most efficient and effective way."

"Standards almost always work best when they are voluntarily adopted and implemented," Weiland points out. "Mandatory standards, particularly in technology realms, always risk bringing forward-progress to a halt. The appropriate role for standards mandates is where public health and safety is concerned, or where there is an obvious pressing public good to be achieved that might not happen without the mandate. I don't think, generally, that the subject matter of NTCIP falls into this category, but as voluntary standards, I think NTCIP could be quite successful."

Even if there is no plan to mandate NTCIP, however, some agencies feel pressure to include NTCIP in projects in order to obtain federal funding.

"Sometimes you cannot get funding unless you specify NTCIP," Gotfredson notes. "We were told that funding might be in jeopardy if we do not specify NTCIP. Whether that would happen or not I don't know, but we were told that might be an issue."

"We had to use devices that were NTCIP compliant if we were going to use FHWA money, and we had to prove it," Koehler confirms. "At a point, we gave up going after federal funds, and started to do everything with local dollars, because I got tired of trying to meet NTCIP and other federal requirements."

"I wish they would not force NTCIP on people," adds Gotfredson. "Let NTCIP stand on its own merits. I think that is fair."

USDOT counters that NTCIP is not officially required but confirms that the department does encourage use of standards-based ITS technologies. "While there is a requirement (23 CFR 940) for states to develop and maintain regional ITS architectures in order to use federal funds for ITS projects, there is no requirement for federally-funded projects to use NTCIP or any other specific standards," USDOT says.

In any case, NTCIP appears to be backed by strong support and faces equally strong objections. As long as this divide exists within the ITS community, NTCIP is certain to remain a source of debate for the foreseeable future. ■

Pete Goldin is a freelance journalist specializing in transportation and technology. He has written for magazines such as ITS International, World Highways, Parking World and the ITS Daily News at the ITS World Congress. Mr. Goldin can be reached at petegoldin@gmail.com.

Standardized Stagnation

By Brian Hagen, Wavetronix COO

The NTCIP debate has always been a question of innovation: does the need for standardized interoperability complement or interfere with the market's constant need for technological advancement? From a manufacturer's point of view, the interference is undeniable. NTCIP dictates functionality without acknowledging market need, and the unstated purpose seems to be to minimize costs by forcing everyone to play at the same level. Unfortunately, this stifles innovation without addressing the market's need for more technology.

The "interoperable versus proprietary" challenge arises when market-driven product development — which evolves very rapidly — is supplanted by standards like NTCIP, which has historically responded to market innovation at a very modest pace. This is most evident with traffic detection sensors, which have consistently outpaced the NTCIP standard. NTCIP reduces the capabilities of advanced traffic sensors by eliminating the very features demanded by the marketplace. As a result, every sensor manufacturer who responds to market demands for features risks creating a product that is not NTCIP-compliant. For this reason, there has been almost zero market demand for NTCIP-capable sensors, and when NTCIP is specified, it is rarely implemented for sensors. This market reality influences product development: even dynamic message signs, which have seen significant NTCIP compliance, have begun to challenge NTCIP with features not available in the interface standard.

As the market leader in radar vehicle traffic detection, Wavetronix is committed to responding to the needs of our market with the most innovative technologies, and we excel at meeting customer demands for feature-rich products at a competitive price. We design our proprietary technologies to integrate well with other products, but our market-driven features-set will always surpass the NTCIP standard.

This discussion is not exclusive to the ITS industry, but has been a constant debate in information technology circles for decades. However, in other industries, market-driven solutions that encourage innovation are winning the day. Mandating a standardized protocol will not meet the evolving needs of the ITS market. **Wavetronix believes that innovation should be driven by the market and not limited by imposed standards, and we will readily support any solution based on this market reality.**