

Chromebooks* with Intel® Technology Deliver Wireless Reliability for K-12 Learning

Intel® Core™ i3 Processor, Intel® Celeron™ Processor
Mobile Computing
Education



“Relevance is a big theme for us. We want education to be as real-world and relevant as possible, and technology is uniquely positioned to help make that happen. A great teacher can use technology to have kids reach out and have an impact.”

– **Tim Goree,**
Director of Technology Support Services,
Fairfield-Suisun Unified School District

Not all Chromebooks* are created equal. And wireless communications can be a crucial differentiator as school districts increase their use of mobile devices. Those are the conclusions drawn by technology leaders at Fairfield-Suisun Unified School District (USD) in Northern California. After earlier Chromebooks with non-Intel technologies caused ongoing network problems, the district found a solution in HP 11* Chromebooks with processors and wireless chipsets from Intel. District leaders say the new devices provide the robust communications they need for one-to-one learning—and their technology strategy is helping teachers increase student engagement and implement the Common Core Standards.

Challenges

- **Reliable, affordable devices for student learning.** Fairfield-Suisun USD needs durable, cost-effective devices to fulfill its vision of technology access as a basic human right for students.
- **Enterprise-class wireless.** Fairfield-Suisun USD’s early Chromebooks, many with non-Intel processors and chipsets, caused network issues that interfered with the district’s bring-your-own-device (BYOD) program.

Solutions

- **HP Chromebooks.** After rigorous testing, the district chose HP 11 Chromebooks with dual-core Intel® Celeron™ processors, Intel® Dual-Band Wireless AC-7260 adapters, and the Google Chrome* OS.
- **HP ProBook* 640 laptops.** Teachers use ProBook thin-and-light laptops equipped with a more capable Intel® Core® processor, Windows* operating system, and Google Chrome.

Technology Results

- **Reliable quality.** The new Chromebooks provide consistent connectivity even at large one-to-one schools. Students enjoy solid performance and reliable access to Google Apps for Education* and other online resources.

Educational Value

- **Student-centered learning.** Teachers use technology to guide students through an education that is deeply relevant to their lives. Students engage more fully with the world around them and develop 21st-century skills.



Fairfield-Suisun USD views technology access as a basic human right for students

- **Teacher productivity.** Teachers enjoy a powerful mobile platform for developing lesson plans, incorporating new curriculum resources, and managing administrative tasks.

Technology Access as a Human Right

Located halfway between San Francisco and Sacramento, the communities of Fairfield and Suisun City touch on California's produce-rich rural Central Valley as well as its vibrant Bay Area. Their unified school district, formed in 1968, enrolls approximately 22,000 K-12 students at 30 schools, including three comprehensive high schools, three comprehensive middle schools, 17 elementary schools, several alternative schools, and more. The district—diverse both economically and ethnically—is home to Travis Air Force Base and the Jelly Belly Candy Company's headquarters.

Fairfield-Suisun USD's vision is to be a premier learning community that empowers each student to thrive in an ever-changing world. As part of that vision, the district has committed to a view of technology access as not just a key enabler, but an essential human right for students.

"Gone are the days when kids went to the computer lab for 'computer time,' as our goal is to provide students with 24/7 access to one another and to the world," says Kris Corey, the district's superintendent. "Fairfield-Suisun USD prides itself on blazing the trail for other districts. Our students deserve technology access to become more creative, to enhance their problem-solving skills, to become critical thinkers, and to collaborate with others."

"We see a lot of school systems that are still looking at computers as an add-on," says Tim Goree, the district's director of technology support services. "At Fairfield-Suisun USD, we've made a mental shift. We view technology as core to teaching and learning. Technology gives students access to the knowledge of the world and the tools to produce professional-quality work, like you would see in the working world. We believe students have a right to access those things—a human right. Technology is something we should be funding out of the general budget, something we shouldn't be cutting when funds are tight any more than we would cut the funds for electricity. Our technology policies start there."

Fairfield-Suisun USD also sees technology as essential to teaching the Common Core Standards. "We believe it's impossible to fully teach many of the Common Core Standards without technology," Goree says. "Many of the standards strongly imply that the use of technology is required to show mastery of the standard."

A Flexible Environment to Meet Diverse Requirements

Recognizing the importance of technology access made one-to-one mobile devices a logical goal. District leaders wanted instructional objectives to drive device choices, and were determined to avoid pushing all schools onto a single platform. Instead, technology leaders meet with school principals individually each year to discuss curriculum goals and align technology purchases. In-depth surveys of students, teachers, and parents provide data to guide planning and shape further improvements.

District leaders established flexible BYOD policies to allow for more student ownership and control, reduce the number of devices the district needed to supply, and encourage teaching practices that focus on the content, not the tools. Infrastructure teams engineered the district's network to provide high-performance communications for a wide range of devices.

The Sweet Spot for Chromebooks

District leaders identified Chromebooks as platforms that could meet a wide range of instructional requirements, particularly for grades 3 through 8, at an affordable price.

"We've found the sweet spot for Chromebooks is third grade and up," Goree says. "We like the price, obviously. We like the simplicity of use and the focus on the Internet. Just about anything you need to do on a daily basis, you can do with an Internet application. We're a Google Apps* district, so the Chromebooks are great for that. But we're flexible. At the high school level, we have lots of Chromebooks and Windows laptops. K-2 tends to use iPads*. Sheldon Academy of Innovative Learning, one of our K-8 schools, has a theme of multimedia production, and they use iPads and MacBook Air* laptops. But in general, if we need kids to be doing heavy video, we find it's more economical to give the kids one-to-one Chromebooks for everyday use and set up a media lab for the school."

Goree notes that the Chromebooks are well suited for administering the Smarter Balance Assessment Consortium (SBAC) tests, which California has adopted. "Chromebooks are the easiest devices to use by far for electronic testing," he says. "The

SBAC tests are made to work on a laptop or desktop form factor, so a full keyboard and screen make them easier to navigate. With the Chromebook's secure browser, there's a button on the login screen that can take you into the secure browser and right into the test environment."

'Weird Wireless Problems'

Goree says Fairfield-Suisun USD has benefited from rapid advances in Chromebook PCs. The district made its first purchases during the 2013/2014 school year, and was on a tight timeline to deploy the devices before standards-based testing in the spring. The district selected Chromebooks based on the ARM* architecture.

"There were not a lot of choices back then," Goree recalls. "We liked the Chromebooks, and the deployment was easy once we figured out a few things. But the devices had some physical issues, like flimsy screens and cases."

Preparing to purchase additional Chromebooks a year later, the district chose devices based on an Intel® processor but with non-Intel wireless components. "Those Chromebooks were more durable, but we started seeing weird problems with our wireless network," says Goree. The newer Chromebooks had dual-frequency wireless cards that offered both 2.4 GHz and 5 GHz operations, and Goree's team configured them to operate at 5 GHz. But the devices automatically connected to the lower range rather defaulting to the higher one.

"We could have fixed things by turning off the 2.4 GHz capability on our network, but that would have messed up any BYOD student whose device only had 2.4 GHz," Goree explains. "That became the big question as we prepared to make another large purchase. Could we get a Chromebook that would connect at 5 GHz by default when both 2.4 GHz and 5 GHz networks are available?"

Intel® Wireless Technologies Solve the Problem

Again, the technology team talked with vendors and tested available Chromebooks. They found a solution in third-generation HP Chromebooks with Intel processors and wireless chipsets. The district purchased 2,300 of the Intel® technology-based Chromebooks this year, and Goree says the wireless is working great, even in schools where density is climbing. "Our largest one-to-one school, Grange Middle School, has nearly 1,200 students in a fairly compact area," he states. "The network and the new Chromebooks are doing fine."

Goree attributes that stability to the maturing of the Chromebook ecosystem and the availability of school-quality devices. "A Chromebook that's made for consumer use might be good enough for a family network with one or two devices, but if you have hundreds or thousands of devices in a building, you need enterprise-level equipment," Goree says. "That's why we've been buying the HP Chromebooks with the Intel processors and wireless components."

In Goree's experience, wireless components are crucial, especially for platforms that run primarily cloud-based applications. "Through trial and error, we've learned it's important to not skimp on the wireless card," he says. "If the wireless card doesn't work well, the device is useless. The wireless card is the differentiator. We had problems with no-name chipsets. We were willing to go up in price to get the Intel wireless card, because we've found it works a lot better. That's where the real value has been for us from Intel."

Professional Development Builds Success

To help mobile devices deliver on their potential, Fairfield-Suisun USD has developed a comprehensive planning and deployment process. Educational technology project managers work closely with principals, teachers,

Lessons Learned

Fairfield-Suisun USD's experiences highlight the importance of high-quality, enterprise-grade devices, including network components, for one-to-one learning environments. They also emphasize the need to test your network and device configurations.

"We laugh about wireless being voodoo," Tim Goree says. "There's some magic to getting the wireless to work well and getting devices to work and play together on the network. Each school has somewhat different needs because of things like the structure of the buildings. My advice is to plan to do lots and lots of testing—and don't skimp on the wireless card in your devices. Wireless is definitely one of the most challenging and interesting aspects of deployment."

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and instructional coordinators as a school advances toward a one-to-one learning environment, with professional development as an integral part of the preparations. "We do just-in-time professional development, and it's a big part of our success," says Goree. "Teachers get the new devices and the professional development in tandem. The project leaders plan it out with the principals and schedule it for when it will be the most effective." Teachers use HP ProBook 640 laptops powered by a more capable Intel Core processor, giving them great performance for the full range of their applications and tasks.

Fairfield-Suisun USD integrates its educational technology professional development specialists into its central professional development department. This approach helps ensure that educational technology skills are infused into professional development programs such as those aimed at coaching beginning teachers or advancing teachers' mastery of the Common Core Standards. For ongoing professional development, educational technology specialists work with teachers individually to explore new teaching strategies and integrate technology into their lesson plans.

"The educational technology specialists are our key culture changers," Goree says. "They create demand and help teachers use technology to make everything they do better. We'll also arrange field trips for a principal and a small group of teachers to visit a school that's further along with its use of

technology. Having them see teachers using technology in meaningful ways in the classroom and being able to connect to those successful teachers is much more powerful than anything I could say. I've had teachers start out feeling, 'I'm never doing this; you can't make me,' and when they come back, they've completely changed their minds. Seeing it is very compelling."

Impact: Relevant Engagement and Learning

With the district's mobile devices and one-to-one learning strategies, Fairfield-Suisun USD's students and teachers are better able to create personalized learning experiences that are relevant to students' lives, interests, and educational goals. Students are using their Chromebooks on a regular basis in all academic areas. Their dual-core Intel Celeron processors provide performance to conduct research, access curriculum resources, and collaborate with everyone from peers to community experts.

"Relevance is a big theme for us," says Goree. "We want education to be as real-world and relevant as possible, and technology is uniquely positioned to help make that happen. A great teacher can use technology to have kids reach out and have an impact."

Using technology, students are excited about learning. They're producing high-quality content and developing 21st-century skills such as critical thinking and collaboration. They're engaging

with the community to present their results, share their research processes, and exchange ideas with experts.

In addition to preparing students for the future, the students' technology-enabled engagements with the community are helping to educate parents and other stakeholders about technology's important role in education. Students' work is also showing what the Common Core Standards look like in action—and alleviating concerns.

"Technology gives students this wonderful ability to connect with other people," Goree says. "It provides the means to create engagement with the community, to have ongoing conversations and connections. When our parents and communities see the level of work our kids are doing, they can see how Common Core is having a positive impact and bringing our kids to a much-higher level of thinking. The excitement and engagement and the quality of work our students are doing are incredible. It's not about the technology, but about what the technology makes possible."

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