

ConnectED Bus



*Improving Safety, protecting students from school to home, faster notification, driving better student outcomes and extending the teaching environment with the **ConnectED Bus Solution***

Wi-Fi on a school bus is not a new debate; it has been tested and employed by many school systems around the world. Lesson's have been learned by the emergence of GPS and how that went from a simple location tracking feature to a value proposition comprising of advanced logistics & geo-fencing technologies that have revolutionized the transport of school children across the world. Just as GPS technology developed and matured, so has the equipment to support Wi-Fi in transit, not only in mobile bandwidth but in terms of the many associate solutions that are now available to ensure a more robust value proposition.

Again the parallels of GPS technologies show that the equipment providing advanced Wireless LAN and LTE connectivity on a school bus has evolved considerably. The move to digital learning, 1 to 1 computing ratio, and common core standards has heightened the desire to enable connectivity on the school bus for more than transportation purposes, unlocked new ways to ensure School Bus routes are not only efficiently and safely transporting students, but aide the development and progress of students education.

What is the **ConnectED Bus**

SPECIFICALLY DESIGNED FOR TRANSPORTATION
PROVIDES ADVANCED COMMUNICATIONS
EXTENDS SCHOOL DISTRICT CONNECTIVITY
...SECURES SCHOOL TRANSPORTATION
OFFERS NEW ABILITIES TO STUDENTS / TEACHERS
OVER A MOBILE BROADBAND SERVICE

To meet this demand, Alcatel-Lucent has created a solution called “The ConnectED Bus”, this brings together functionality that will enable all K-12 School Districts to cost effectively deliver new experiences to students, teachers and bus drivers across their school transportation system. By using Alcatel-Lucent’s proven Automotive hardened equipment, and integrating them with an existing array of K-12 education communication solutions, the ConnectED Bus offers new levels of access within the bus, improves security and provides advanced learning environment, at a sustainable, cost-effective price that K-12 Schools can afford.

Why should School look at the ConnectED Bus now?

Student safety and school transportation continues to be a prime directive of all K-12 School districts, and although the US Department of Transportation states that School Buses are the safest mode of transporting children back and forth. School Districts and Regional Education authorities continue to look at enhancing the system, installing technology to improve safety practices, monitoring of driver and student behavior. Most of this effort has been on utilizing the power of location based information from GPS equipment and GPS linked applications. Until recently the level of bandwidth for the combination of GPS and mobile services was too costly or poor coverage, but now with the increasing maturity of mobile broadband and the use of more robust equipment proven in the hardened environment of a mobile vehicle to improved uptime and QoS. The amount and creativity of strategies & solutions are growing in numbers.

Deliver safety through better engagement

This has led schools to not just improve the safety and efficiency of transport, but add technology that brings influence on a successful student’s life. Why not provide a controlled portal for homework to and from home, letting students enjoy more free time at home, instead of having to wait on board the bus before getting home to complete the tasks to help them learn?

Inspiration from Public Safety and Transportation customers

The core of this solution has considerable installed base in the US, deployed in Public Safety (Fire, Police, Ambulance vehicles) and Transportation customers (such as Train, Bus, Boats etc). A good example is the deployment in public transit buses in Boston (MBTA) use this same technology with a Public Safety focus video.

<http://boston.cbslocal.com/2014/02/10/mbta-buses-get-live-video-technology/>

- This is an example of the ConnectED BUS solution can provide connectivity with On-board Video Surveillance integrated with the whole system with cameras, DVRs and onboard digital signage.

Increased emphasis on Students, Situations and surveillance

Ahead of a nationwide review of school security measures, a study by a State Education department in Idaho finds major gaps in School Safety and Security.

The entire nation can learn from Idaho, where thorough safety and security assessments completed last fall show that a significant portion of the state's K-12 campuses are still vulnerable.

http://www.campussafetymagazine.com/article/study_finds_major_gaps_in_school_safety_and_security/safety

At the same time the School and Campus Safety Enhancements Act of 2013 - (Sec. 2) Amends the Omnibus Crime Control and Safe Streets Act of 1968 to authorize the use of school security grants by the Office of Community Oriented Policing Services for the installation of surveillance equipment for the reporting of potentially dangerous students and situations. The ConnectED Bus solution presents a perfect solution that improves safety but also delivers improvement in education and Connected knowledge.

In fact when schools consider the impact of the various initiatives aimed at improving success in K-12 Education, or bringing in new technologies to improve education accessibility and deliver more personalized learning, the idea of extending the school campus to the school bus becomes more and more of interest.

Isn't GPS enough, isn't it too expensive to justify?

Education focused initiatives such as Common Core Standards, eRate (based on the purposed reforms), ConnectED from Obama's administration, all support technology to increase student access to digital devices, digital learning, online testing and looks for more technology led innovation in the classroom, letting teachers maximize broadband technologies for all students. Why not on the specific school buses for specific children? Or why not all of them?

The numbers of devices in K-12 schools are multiplying exponentially every year, and it's not just students or teachers bringing their own devices (BYOD). Race for the top, 1:1 computing ratio programs look to increase the use of devices, online content, virtual campus software and digital textbooks, creating an environment where extending the access to the journey home would in essence extend the time students can learn.

These initiatives and programs are built to help schools utilize funding, and ensure that they spend the money on improving student outcomes. In the case of the **ConnectED BUS**, schools can utilize both teaching and security grants focused on building safer schools and the increased use of video surveillance to react to potentially dangerous situations, and students, means that combining efforts can attract funding and also deliver more tangible results.

Who should be interested in the ConnectED Bus solution?

As LTE and WWAN connected devices start to become more common place in our communities, so will the interest using this power in the education and well being of our children. Interest in the ConnectED BUS is already a huge talking point. Who will be interested in hearing about this solution? It is a source of conversation for everyone connected to a school district, from the Transportation Director to the Superintendent; From the Campus security to the CIO; the teaching staff to the instructional technology resources; the students to the bus drivers

themselves. Everyone in the ecosystem of a school has an interest in this solution. The potential to create innovation in teaching, and a student's life is abound.

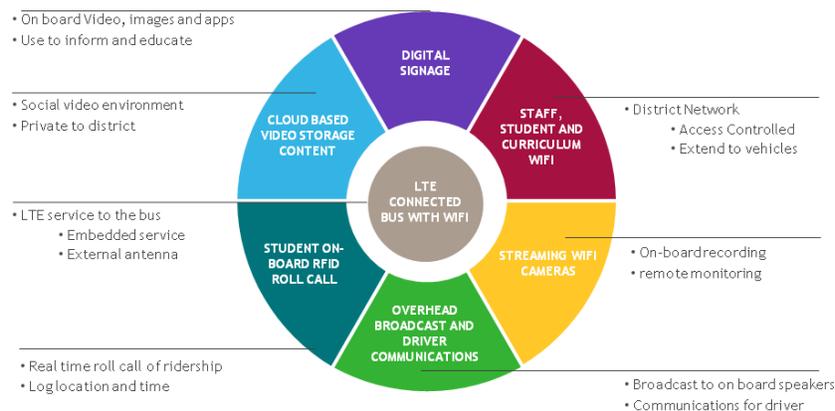
Is it just LTE & WIFI at the core?

At the core of the solution is Alcatel-Lucent's OmniAccess 5725A service router, designed for transport, built with no fan, solid state DC powered unit with hardened software and embedded dual SIMS for a resilient LTE connection. Using external antenna for both Wi-Fi & LTE, the unit ensures the highest throughput at all times, and provides a high speed, low latency connection back to the school district core. The unit provides wired and wireless Ethernet on board the bus, so that any authorized devices can at speeds up to 802.11n. The base solution is designed to extend all the school district policies over VPN tunnel. This infrastructure is the core and foundation for a layered approach.

Layered Approach?

Layering services and applications together with the core capabilities of the ConnectED Bus will enable Districts to build unique services to directly target the needs of Staff, Students and the bus drivers on board. The core capabilities allow access to designated education applications and portals via the bus network. The ability to access learning management systems and digital learning modules from on the bus opens lots of possibilities. This means that classroom applications, curriculum and tools can be accessed at any time during a journey. The core solution will also will enhance the existing video surveillance capabilities of the School Bus, offering real-time streaming video by using more wireless IP cameras and LAN connected DVRs.

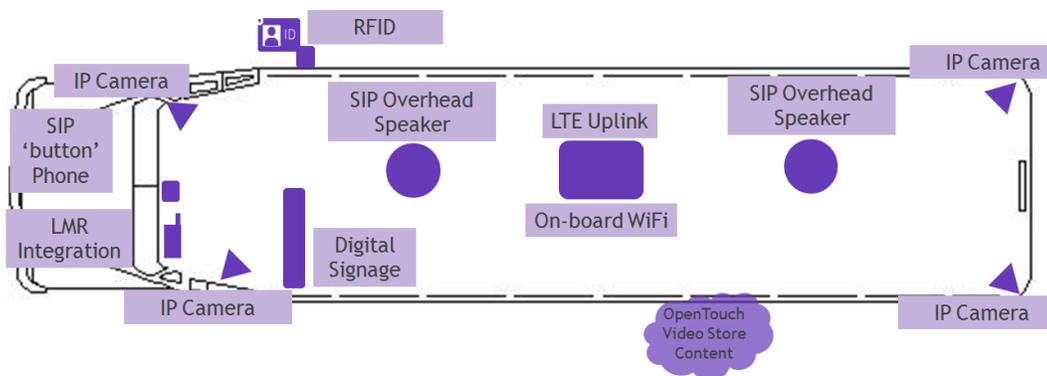
School districts can then build on top of the ConnectED Bus core architecture with a number of enhanced solutions using integration and bundled services that go even further. Real time roll call of riders, parent notification of embark, disembarking, right bus / wrong bus scenarios. The connectivity allows the use of wireless SIP based overhead speakers to improve communications to students and driver (such as school announcements and emergency procedures).



School district or contracted transportation companies will be able to utilize onboard recording and remote monitoring easily, as well as a faster and more cost effective way of off loading stored video content from the onboard DVR of the traditional cameras. This can also be relayed live to TV's on the school bus to help promote safe travelling to the students. This can also be combined with a full suite of Digital Signage applications that can inform and educate students on board. For example, run some relevant video on a topic to the children on the way to a museum for a school trip, or run previous game video as a way of going over tactics for a trip to a rival High School Football game. By combining controlled video content, social media tools and cloud based storage; the school bus can also become a Mobile Flipped Classroom that can become a standout way to engage children in a digital learning environment.

When combined with Alcatel-Lucent's award winning OpenTouch Suite of collaboration and communication solutions, the power of the ConnectED Bus is even more powerful to leverage by K-12 Schools. Using OpenTouch Video Storage (K-12), for example, Schools can create a completely secure source of video content and isolate its access to the confines of the school bus, anywhere it travels.

By utilizing the increase bandwidth, the resilience provided by Alcatel-Lucent's hardened service router equipment, designed specifically for the unpredictable effects of a moving environment, Schools will also be able to utilize new innovating solutions in places and ways that even we can only predict. The ConnectED BUS unlocks potential for schools in so many ways. Already Alcatel-Lucent has heard of schools considering innovating ideas such as a homework bus for underprivileged children in areas without internet or devices, Virtual Teacher support for Bus Drivers using the real-time video and Broadcast capabilities to help them control problem students, A temporary classroom when disaster strikes and student's are in the middle of testing etc...



Solution Summary

ENABLE

- On-line - On-the-bus
- Utilize travel time



EXTEND

- District video content
- Access to school resources



SECURE

- Live & Recorded cameras on-board
- Driver Communication
- Maintain district on-line policies



INFORM

- Dynamic updated digital sign
- Offer curricula content
- Ridership logged by RFID



About Alcatel-Lucent Enterprise & Education

As a thought leader for communications and infrastructure technologies in K-12 education, Alcatel-Lucent has a defined focus on the needs of K-12 education customers and has designed solutions to meet the specific needs of today's classroom and education environment. We provide solutions that provide state of the art connectivity both wired and wireless, integration with existing and emerging classroom technology such Learning Management system, Interactive whiteboards, Digital Signage, Video platforms, clock/bell/intercom integration, and time-of-day ringing. Our telephony solutions are also extensible to address building safety concerns through entry door camera/access control integration, E-911 services, and emergency security response systems. Our enterprise specialization in the education market will help K-12 School Districts to enhance learning, parental involvement, technological innovation, and security.

Alcatel-Lucent provides the key technology *and* the people you need to support your solution. Alcatel-Lucent solutions are provided through a comprehensive channel of business partners who will address and coordinate the needs of any K-12 School Districts, from implementation through the life of the system. Our Business Partner provides local support and function as the escalation point of contact and is also the facilitator of engineering and technical support.

Alcatel-Lucent provides K-12 School Districts with help to provide an innovative, safe and secure learning environment, while also enhancing existing classroom technologies to improve student outcomes, streamline professional development, and contain administrative costs. Our solution's design and support will protect any K-12 School's existing investment and integrate with their existing infrastructure and environment. With a defined focus on the needs of the education sector, our competitive pricing with a best of breed automated and flexible cloud infrastructure solution, Alcatel-Lucent is the vendor of choice for any K-12 Schools Infrastructure and communication needs.

ConnectED Bus (in summary)

- **Extended Campus Infrastructure to the School Bus**

The connection can be provided for the children to connect their Wi-Fi enabled devices to same school environment

They are able to use the school districts' internet connection while on the way to school for them to connect out to the Net or to communicate to friends and/or family without the requirement of a cellular device. Even complete homework on long journeys.

Connected Mobile Classroom

The very same service can be used to provide background information via the class portal for the children to access and read on the way to their field trip. The usual 'down-time' associated with the transport part of a field trip, continuing planned curriculum content while en-route.

To engage the children and to glean whether they have completed the background reading the on-board digital signage could be used to push out a pop-quiz to the students and they could even use their devices to answer the questions and work their way up the leader board for the class that day.

Bus transport is now monitored and informed. Information on journeys is readily available and the bus can now be brought in as an extension of the classroom.

- **Connecting On Board Devices to School Campus**

Mobile devices including Smartphone, Tablet, PC and MAC accessing School Network

On board IP Cameras

- Installed IP Cameras are connected back to central and are always on. The cameras monitor the bus and all the occupants providing an extra set of eyes for the driver along with a view of the run to school for anyone in central to monitor in real-time, or refer to after the fact.

Notification and Communication tools (VoIP / UC enabled / Speakers)

- A VoIP voice link to provide a mechanism for the driver to be constantly connected to central. He or She can speak to them; provide updates on his progress that day and request assistance if necessary. This can also provide a way for central to converse with the driver should they spot anything on the camera feed that he may miss while he is attending to the road ahead. The whole solution provides extra security.

Innovation / Multimedia (Digital Signage / Video Streaming)

- Digital signage on the bus provides extra information to the children:
 - School events, today and this week
 - Important reminders for the students
 - The results and standings of the school teams

- Edited highlights of today's headlines
 - The current location of the bus on the route
 - And the weather forecast
- **Other Examples**

Temporary Classroom Mobile Wi-Fi Hotspot

- Potential to house students (on the BUS or near a BUS) during extreme circumstances with access to applications.
- Homework / Revision bus for Students without access for internet or no devices at home

Evacuation and Lockdown Situation

- Children can continue to study, interact even if held on the bus for long periods. Or driven to remote location away from campus.

Field Trips and External Events (Sports / Competitions)

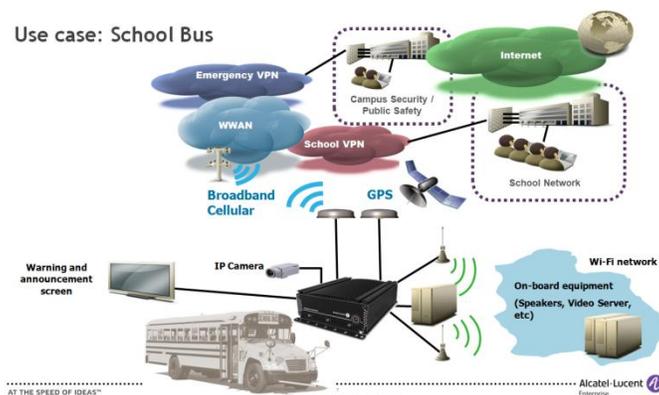
- Travel time can be more productive, other lessons will be less disrupted as students can collaborate back to lessons or cover homework.

Improved access in recreation areas or non wireless covered zone (becomes a Mobile Access Units)

Announcements extend to all Bus users (Notifications)

Integrated Video and Real Time communication. – Driver Safety, Improved awareness, Child safety, Stop Bullying situation etc

Integration with Emergency Notification and Public Safety



Characteristics of OmniAccess 5725A Automotive Service Router

- Robust 4G Interface layout
- Embedded broadband cellular interface, permanently supervised
- 24x365 use vs. USB or PCMCIA based-devices
- Optimized signal coverage and stability: dual cellular antenna per module for Rx diversity
- Secured Wi-Fi 802.11a/b/g/n interface with dual antenna
- Configurable operation role (AP or Client)
- Scalable, managed and secured wired Ethernet
- 4xFE switch port serves IP cameras on board
- Full VLAN support, MAC filtering, Advanced IP filtering
- Console port (RS-232) and line status LEDs for on-site diagnostics
- Resistant to vibrations and heat
- Feeds directly from vehicle battery, with protections against voltage spikes
- Ignition-based delayed power off
- Advanced GPS with high precision and fast fixing
- WWAN+ proprietary optimization of network protocols for improved communication over cellular networks
- Constant monitoring of WWAN connection (actively and passively).
- Selection of best available network
- Fallback option: dual SIM
- GPS geo-fencing

