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Analysis of the "Blirpit" AVL System

Completed December 15, 2009

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I. Introduction to the 'Blirpit' Bus Tracking System

Blirpit is a cellular based automated vehicle location (AVL) system designed by two University of Vermont undergraduates, Michael Fogg and Nicholas Godin. The system was designed primarily with college and university transit systems in mind and allows students to view the real time location of their bus on a website, text message or via an iPhone app. Each bus is equipped with a GPS receiver and cellular data card which transmits location updates at a predetermined interval. Blirpit is designed as a hosted AVL system in which Blirpit owns and operates the back-end hardware and software and makes it available on for a per-bus monthly fee. While this dramatically reduces upfront capital costs, it has the potential to substantially increase operating costs over time. This report examines the feasibility of implementing Blirpit to serve CCTA's AVL needs and was complied after multiple discussions with Blirpit's founders as well as outside research.

II. Present Blirpit Implementation (UVM)

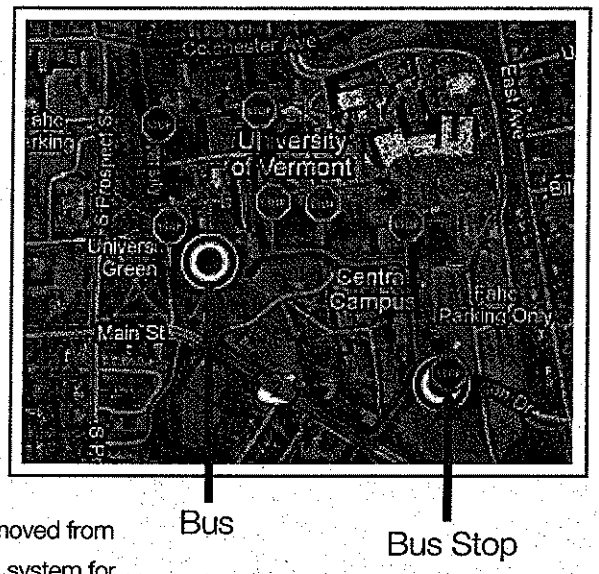
At the time this report was compiled, Blirpit was still in it's beta testing stage and was operational only at a single location - the UVM Campus. UVM operates three primary routes which all feed back into themselves as loops. Each driver and bus only drives one route per shift - unlike CCTA, no interlining takes place. Every UVM bus is equipped with a GPS and a cellular transmitter for which UVM pays $15 per bus, per month for the service.

A. Beginning of Shift

At the beginning of each shift, the driver of the bus uses an iPhone or iPod Touch to conduct their pretrip and choose which route they will be driving that day. The system electronically accepts the driver's pretrip report and stores it in a web accessible system. Management can view the report through a web-based interface if they wish to confirm that pretrip inspections have been completed. If a driver were to change routes at any point in the day, they would need to access the iPhone and change the route they were driving manually. Failure to do this will result in the system reporting incorrect bus location information to users.

B. During Shift

Once the above information has been entered, the driver may start driving their route. Users may then access a web or phone interface which shows the location of stops and buses (pictured right). Based on the position and movement of busses, users can make determinations about when the bus will arrive at their stop. At present, the online interface does not predict arrival times.



C. After Shift

Once the driver has completed their shift, they will return to the garage. A 'geofence' is set up so that once the bus enters the storage area it is automatically removed from the online tracking system and is shown as available in the system for another driver to take.

III. AVL and Operational Differences: CCTA vs. UVM

Compared to UVM, CCTA has a vastly different set of challenges in implementing an AVL solution. Given that Blirpit is relatively new and designed with colleges and universities in mind, it does not presently have the features or level of integration necessary to be a full transit solution.

A. Interlining

The most substantial difference between UVM's network and that of CCTA's is the practice of interlining. A UVM driver starts his shift and drives the same route for the duration of the shift. A CCTA driver begins his shift and drives a series of different routes over the course of the day. From an AVL perspective, this results in a much greater challenge. With UVM's Blirpit implementation, the driver is responsible for entering their trip at the beginning of the shift on a iPhone or iPod touch. Since the driver only is driving a single route, the system knows which route the bus is on and displays it accordingly. At CCTA, an AVL system would need to accept a run number, not a particular route. It would then have to interface with HASTUS, CCTA's scheduling software to determine the routes that the bus will be traveling on that day. The system would need the ability to determine when a bus is arriving back at Cherry St (or wherever the point of origin for the next run would be) and then determine which run comes next. It would also need to be able to update passenger displays based on future routes - i.e. if the inbound UMall/Airport is scheduled to become a North Avenue bus and is running 10 minutes late, the system needs to be able to mark the displays at Cherry St to show a 10 minute delay for the North Ave bus. Blirpit's present implementation has no features to interface with external software packages, automatically determine routes or accommodate interlining.

B. Dispatcher

CCTA utilizes a dispatcher during the vast majority of the time that buses are operational. The dispatcher assigns drivers to buses, monitors delays, assigns standbys as necessary and is the first line of communication when operational problems develop. Therefore a critical element of an AVL system is a dispatcher interface that shows the position of all buses, which drivers are assigned to which bus and highlights operational difficulties like buses running behind or ahead of schedule. The dispatcher also needs an interface to assign drivers to buses, monitor and assign standbys, swap and change the runs assigned to each driver and bus and conduct other day to day tasks. Given that UVM does not operate with a dedicated bus dispatcher, Blirpit has no such interface. The most information a dispatcher would have access to are the same maps that the general public can view online.

C. Passenger information displays

CCTA presently operates two LCD passenger displays on Cherry St and may implement other digital signage in the future. Any AVL system needs to have the ability to interface with passenger displays, a feature that Blirpit currently does not provide.

D. Complex routes/trip planning

UVM operates three basic routes with consistent headways over a large span of time. Passengers typically board a single bus to complete their trip and transfers between buses are unnecessary and practically non-existent. CCTA operates a complex series of routes that span a wide geographic area with schedules that vary substantially based on the time of day and day of the week. Transfers are routinely used to reach a final destination. As a result, a desirable feature of an AVL system would be a trip planner or integration with existing trip planning services (such as Google Transit). This would permit customers to enter origin and destination points and be presented with various options to take their trip using CCTA. CCTA receives regular comments from customers expressing desire for such a service and a trip planner would invariably increase ridership as it would make the system accessible and easy to understand for users unfamiliar with our buses or the area. Blirpit has no such feature set, although Google Transit or a commercial trip planner could be pursued separately.

E. Wider demographic

CCTA serves a much wider demographic than UVM. Almost the entirety of UVM's riders are young, familiar with technology and a majority are from comparatively affluent backgrounds. As a result, CCTA faces additional challenges in making information from an AVL system accessible to all riders. Not all CCTA riders will have smart phones, are familiar with text messaging, or have access to a reliable internet connection. Thus it is vitally important that CCTA's AVL system integrate with electronic signs and include technologies to broaden accessibility of the service, such as a telephone based information system. At present, Blirpit does not support integration with any of these technologies.

IV. Blirpit proposal to CCTA

On Friday, November 6, 2009, Fogg and Godin made a presentation to CCTA to express their interest in developing an AVL system based off of their UVM implementation. During the course of the presentation it became clear that they were unfamiliar with the needs of a transit implementation and were unfamiliar with concepts such as interlining and popular scheduling packages such as HASTUS. CCTA outlined their needs for an AVL system and Fogg stated that Blirpit could contract with their developers to customize Blirpit to CCTA's needs. He promised to provide a proposal and rough price quote to CCTA. This proposal included customizations for many of the above deficiencies. The proposal is attached to this report as Appendix A and estimates costs for these developments between $251,000 and $554,000 and monthly costs between $0 and $5050 depending on the specific features implemented and structure of the agreement. A five year contract with Blirpit would be required.

Essentially, CCTA would be delivered a custom-built AVL package that had never experienced testing or vetting in an actual transit setting. The most technically difficult parts of the implementation (integration with HASTUS, the dispatcher interface and the electronic sign interface) would be newly constructed would likely require an extensive and intensive debugging and troubleshooting process. There would be no cap on costs and no prior installations off of which to compare estimates. As a result, CCTA would be a dangerous position: using an untested package with development costs that could quickly spiral out of control if implementation is not as smooth as the developers predict. There is a substantial risk of buying into a system that may never work fully or properly and cannot be recommended by any comparable transit agency.

Fogg and Godin have no experience in the transit market and are unfamiliar with many of the practices and procedures of public transit agencies. It is incredibly likely that they cannot accurately estimate the full costs or difficulties of implementing an AVL system for CCTA. CCTA would be embarking on a substantial investment with a firm with no transit track record and who does not directly employ a single individual with experience in the public transit market.

Additionally, Blirpit operates a hosted system. The software and service would be owned, operated and managed by Blirpit, rather than CCTA. Other than the GPS and cellular transmitter units, no hardware or software would be present at CCTA. This makes CCTA's system subject to Blirpit's continued viability as a business venture and may leave CCTA with no rights to operate the system after the initial five year contract expires.

V. Conclusion

Although the Blirpit system may seem to provide an immediate, low cost and local AVL solution for CCTA, it is simply not presently suited to CCTA's needs. It lacks the vast majority of the functionality required for a transit AVL system and any additional features would have no track record or real world testing prior to delivery to CCTA. There is the chance of substantial bugs, a long, expensive testing period and unpredictable development costs. Furthermore, the nature of a hosted system makes it very vulnerable to the viability of the vendor, who presently has no business track record. It is thus strongly recommended that Blirpit be passed over in favor of pre-built, established AVL systems with a substantial record of performance in agencies of similar size and composition to CCTA.

Appendix A: Blirpit Proposal to CCTA

From: "Michael Fogg" <mfogg@blirpit.com>
Subject: **CCTA Bus Tracking Quote**
Date: November 20, 2009 12:25:44 AM EST
To: "Ross Nizlek" <ross.nizlek@cctaride.org>

Hey Ross,

Ok, so we heard back with a quote for customizations and have been working hard to come up with an estimate for how much the system would cost. We spent days trying to come up with a system that worked the best for you and the rest of the CCTA organization and I believe we have something that fits into what you have told me.

Of course, this is very informal and I will gladly go into some more detail as soon as you let me know what you are thinking. We have come up with several plans that will work for us, that delegate the costs differently. Our estimated up front costs range from $554,000.00 to $251,000.00 and our monthly maintenance and support costs range from $0.00/mo to $5050.00/mo respectively, on a five year contract. These costs include:

The blirp it system and all that entails:

1. GPS devices
2. All GPS tracking related fees
3. Support and Maintenance
4. Bus tracking back-end web-accessible software and customization
    * Track and archive:
        - o Bus locations
        - o Time of day
        - o Driver
        - o Route Traveled
        - o Stop time
        - o Delayed/On-Time/Early
        - o Geofence triggering
    * Also included in this is the contents of the System Proposal that we talked about on an earlier date
5. A custom map that can be placed on your webpage, or hosted by blirp it, with route and arrival time information
    * Custom color identifiable routes according to each D-Number
    * Bus location updated every 4-7 seconds
    * Along with the website will be a display of how far it is from each stop on hover-over
6. Text messaging feature available to everyone and accessible on the go
7. Six weather-proof displays with current arrival information as we previously discussed
    * Each display will be equipped with wireless internet for which the 5 year cost is also included in our upfront cost
8. Setup of the iPhone and SmartPhone (blackberry, droid, etc.) web applications
9. New features will be added and updated to your site for all years under contract.
    * Automated phone arrival times
    * Alarm feature- Allows people to set a timer to alert them when the bus is a certain time away from a stop
    * more to come...

I am almost positive that I missed a few features in that list but, I will go into more detail when it gets a little bit more formal. Those costs listed above, again, would be for a 5 year contract. The up front costs would be a one-time payment, or payed in installments, and the monthly fee would be consistent for the 5 year period. No additional charges will be applied at the beginning of each year or at any time.

Hope you like what we have come up with and look forward to hearing back from you. If you are interested in features that I have not listed here or would like to discard some of the features, please let me know.