gmv SYNCROMATICS

City of Norman ITS Upgrade Proposal

May 11, 2020

PREPARED FOR:
Taylor Johnson
City of Norman

SUBMITTED BY:
Jeff Hunter
Business Development Manager

Taylor,

The City of Norman has been a valued client of GMV Syncromatics since 2011, previously through CART. We recently signed an annual service extension. As we have previously discussed, we recommend two hardware upgrades that will improve functionality of the ITS in place currently and increase the predictability of maintenance costs over time.

1) Mobile Data Terminal
   - **Current State**: CON currently operates a complete fleet (with the exception of 2 buses) of our MDT-600 hardware. This is commercial off-the-shelf hardware that is based on the Windows CE operating system, which was discontinued by Microsoft in April 2018. As such, the manufacturer of the MDT-600 has discontinued this product as well. In the immediate term, we continue to refurbish this hardware for our clients but are unable to get any new hardware. In the near-term, maintenance will become impossible. At an unpredictable point in this contract, we will need to switch to ordering the new OpenMDT Plus hardware.

   - **Proposed Action**: Upgrade the full fleet by purchasing new hardware and allowing GMV Syncromatics to buy back the existing fleet hardware, despite it having no remaining useful life. We have included an overview of the Android-based OpenMDT Plus hardware in this proposal. All other ITS components are forward-compatible and will not require replacement if this is option is exercised. All future development will be done on this platform, which makes this upgrade critical for future-proofing the ITS technology in place in the City of Norman.

2) Automated Voice Annunciator
   - **Current State**: City of Norman currently operates a complete fleet of our previous-generation Integrated Bus Announcer "IBA" AVA system. This is a hardware solution that is no longer provided and refurbished units are not predictably available. While these are functional today, we expect that they will fail at an increased frequency in the coming years. They are connected with cabling that can develop loose connections as the devices age, so can be a burden to maintain. This is one of the primary reasons we chose to move away from the product in 2017 and completed the cutover in mid-2018.

   - **Proposed Action**: Upgrade the full fleet by purchasing new hardware and allowing GMV Syncromatics to buy back the existing fleet hardware, despite it having no remaining useful life. We have included an overview of the of the new "TextSpeak" hardware in this proposal. This hardware will streamline maintenance by simplifying wiring and eliminate the need for a separate "driver [volume] control panel" and moving the interior/exterior volume control to the upgraded MDT. It is the platform on which we are currently developing new features, such as multi-lingual announcements, VOIP Radio integration, and Infotainment audio.

Either upgrade will include full project management and training by a GMV Syncromatics Project Manager. I will be happy to share any additional information necessary in making your decision.

Sincerely,

Jeff Hunter
Business Development Manager
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1.Proposed Hardware Upgrades

1-1. OpenMDT Plus

The Syncromatics OpenMDT Plus is the cornerstone of our ITS system inside the bus. It handles all of the data processing, data storage, transmission, and user interface. All these features are packaged in a single modular and swappable package with no separate vehicle logic unit required.

Syncromatics proposes to install a rugged touchscreen computer featuring the Android operating system. The OpenMDT Plus was engineered to protect the tablet against drops, shocks, rain, vibration, dust, liquid and more. The OpenMDT Plus has been independently tested and certified to MIL-STD 810G and IP65 standards.

The OpenMDT Plus uses advanced technology to achieve a display that is more readable and offers better contrast and more crisp colors than any other rugged display. By bonding the display glass with the touch panel and LCD, the OpenMDT Plus offers a single panel that is more durable, minimizes glare and improves readability. Touchscreen works in all weather conditions and is compatible with gloves.

The OpenMDT Plus is delivered with a fully integrated vehicle dock to enable rapid removal/replacement of the MDT. This can support walk-around pre-trip inspections of vehicle condition and safety features.

The dock also provides additional input/output (I/O) ports to support peripheral integrations like external antennae, automatic passenger counters, automatic voice annunciator, headsign, farebox, and other components.

Due to the potential for changes in the supply chain of Commercial Off The Shelf equipment, Syncromatics may identify a functionally equivalent MDT device to the unit pictured here. The ubiquity of the Android operating system enables us to choose from a variety of devices, mitigates supply chain risks, and helps reduce equipment costs. The OpenMDT Plus was engineered to protect the tablet against drops, shocks, rain, vibration, dust, liquid and more. The OpenMDT Plus has been independently tested and certified to MIL-STD 810G and IP65 standards. By bonding our tablets display glass with the touch panel and LCD, the OpenMDT Plus offers a single panel that is more durable, minimizes glare and improves readability. Touchscreen works in all weather conditions and is compatible with gloves.

Our tablet is delivered with a fully integrated vehicle dock to enable rapid removal/replacement of the MDT. This can support walk-around pre-trip inspections of vehicle condition and safety features. The dock also provides additional input/output (I/O) ports to support peripheral integrations.

Open Platform for Diverse Applications

The GMV Syncromatics OpenMDT Plus is a touchscreen computing platform running on the Android operating system. By using the most popular mobile OS in the world, the OpenMDT Plus can run a variety of third party software. The same device can run our Fixed Route Driver software, Demand-Response Driver software, Pre-trip Inspection software, and other Android-based software that your agency may use. Third party apps are subject to review and approval by GMV Syncromatics.

Fixed Route
GMV Syncromatics fixed route driver interface

Easy Rides
Paratransit dispatch and scheduling

TransitCheck
Pre-trip inspection and maintenance

Default Driver Views

The MDT screen is color-coded based on current status. If the vehicle is currently running on time, dials and progress meters will be green. Red represents late, and blue represents early. As you can see in the screenshot below, this driver started his route on time for the first two stops but is falling behind schedule and running late at the third stop.
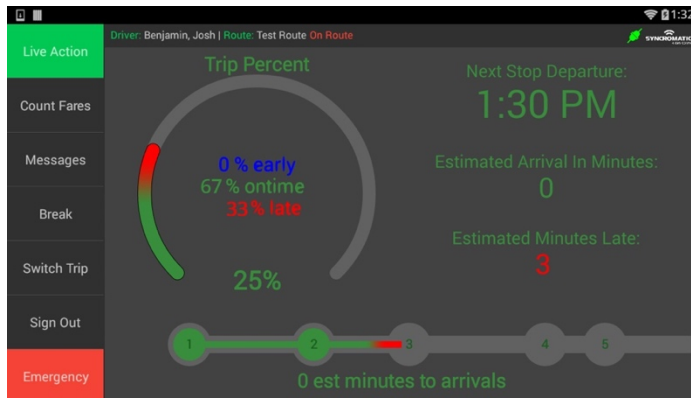
Live Action – Scheduling Screen. This is the most common screen that your drivers will use. It shows them their total distance along a route, distance between stops, and on time status as they're driving, so they can always monitor their process and know where they are compared to the schedule they should be on.
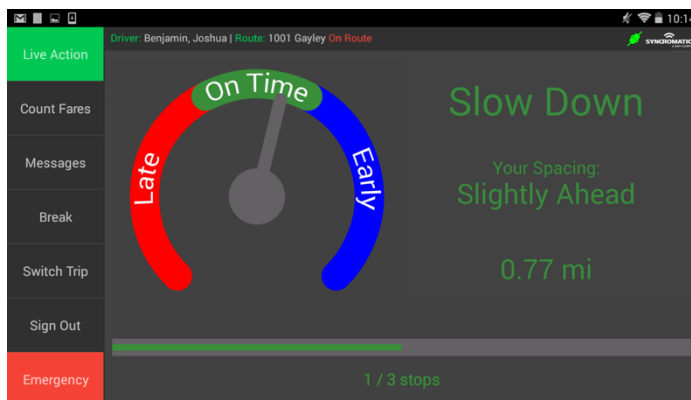
Live Action – Bunching Screen. If your service includes any routes that run on specific headways (the bus should come every 15 minutes, for example) rather than schedules, the bunching screen allows drivers to see where they are in position relative to the buses ahead and behind them. If they are too close to the bus ahead, the dial will point to early and tell them to slow down in order to keep even spacing. Similarly, if they are too close to the bus behind, it will let them know they are running late and should try to make up some ground if possible.

MDT Messenger and Recognition Alerts

The messaging service allows dispatch to communicate with drivers through free form and canned text messages. The GMV Syncromatics MDT Messenger function includes the ability to customize "canned messages." In practice, the first canned message tends to be "10-4" – though this can be customized by your agency. 10-4 is commonly used as a read receipt and can be sent as a reply without the need to type out a message, informing dispatch that the driver has confirmed receipt and understanding of the message.

While "10-4" tends to be the industry standard for this recognition message, you are free to customize as you see fit, and it could potentially read "Acknowledged," "Read," or even simply "Ok." Upon sending of this or any other message, dispatch will receive an alert and the message will be recorded in the dispatch and driver message history.

Automatic Trip Switching to Reduce Driver Workload

To alleviate the burden on drivers from manually selecting a new Trip on the MDT every time a bus changes routes or inbound/outbound patterns, GMV Syncromatics offers Automatic Trip Switching (ATS). ATS combines data about the vehicles current position and operations with schedule data about planned operations to intelligently re-assign the bus. When a bus is nearing the end of its trip, the software will recognize that a switch is coming, identify the next trip scheduled in the run, and automatically move the bus to the next trip without any driver interaction. This process can automatically update headsign and farebox assignments as well. The software always allows the driver or dispatcher to manually override the assignment in the event of a necessary deviation from the plan. This feature is not available on the MDT-600, and will be critical in avoiding the appearance of Missed Trips based on simple driver error.

NTD Reporting

GMV Syncromatics offers an NTD reporting solution as a standard element of our software package to help transit agencies comply with their National Transit Database federal reporting requirements.

The report will automatically calculate totals and averages based on operations, this automated data collection and analysis will reduce the workload on client staff and help provide insights into the operations. The report features interactive drill downs to enable a user to validate any figures that are out of line with expectations and identify the specific day/vehicle/trip that is the source of the outlier. This is only available where Automatic Trip Switching is present, and thus requires the MDT upgrade.

Passenger Statistics

Month	Unlinked Passenger Trips ℹ	Passenger Miles Traveled ℹ	Average Trip Length ℹ
Mar 2018	78,282	585,156	7.47
Total	78,282	585,156	7.47

Vehicle Service Statistics

Month	Vehicle Revenue Miles (VRM) ℹ	Deadhead Miles ℹ	Total Actual Vehicle Miles ℹ	Vehicle Revenue Hours (VRH) ℹ	Deadhead Hours ℹ	Total Actual Vehicle Hours ℹ
Mar 2018	151,545	1,819	153,363	9,274	538	9,812
Total	151,545	1,819	153,363	9,274	538	9,812

Schedule Statistics

Month	Vehicles Operated In Max Service ℹ	Total Days Operated ℹ	Weekdays Operated ℹ	Saturdays Operated ℹ	Sundays Operated ℹ
Mar 2018	91	30	22	4	4

2-1. Next Stop Annunciator

GMV Syncromatics offers an ADA-compliant annunciator system that will automate the process of announcing arrival at each stop when a transit vehicle is in service. The AVA system is fully integrated with the on-board MDT and also with each bus's existing PA and/or speaker system. This system will replace the existing IBA hardware and represents a significant evolution in technology that will be ready for whatever tools are built for years to come.

We have found this system to be both significantly more reliable and effective than previous generation hardware. Further, it is the hardware that we continue to support as the IBA system is currently end of life.

Annunciator Hardware

Audio Processor
The processor receives text signal from MDT and dynamically generates the stop announcement audio, which is amplified and distributed to vehicle speakers.

Interior LED Sign
Signs display route and stop info that matches announcements to meet ADA requirements. Signs also display date/time and customer service messages. (Optional Item)

Emergency Preparedness

Earthquake? Flood? Amber Alert? GMV Syncromatics offers the industry's only AVA product that allows you to type a message at your computer and with a simple request, push that message out wirelessly and be playing in every single AVAS equipped vehicle within <u>minutes</u>.

Key Points: Annunciator System
- ❯ No driver/operator interaction is necessary to operate the AVA system
- ❯ The interior and exterior volume levels can be adjusted by the operator, directly on the MDT
- ❯ The AVA system will integrate with the existing PA system, including microphones and speakers
- ❯ The AVA system has a line-in feature that allows it to take and control an audio feed from an AM/FM radio
- ❯ The system uses a text-to-speech (TTS) engine to make announcements, which can be configured in tone, pitch and volume to suit hard to pronounce stops <u>from your desk.</u> The TTS system natively supports Spanish and other foreign languages by recognizing text in the foreign language and pronouncing with proper accent and inflection.
- ❯ The system has expansion capability (additional costs and survey apply) for internal LED signage to display the information visually, as well as integration with VOIP Radio and Infotainment
- ❯ The system uses several factors to determine when a bus is approaching a stop, including distance from the stop, corresponding previous progress from previous stops, speed, and directional GPS information.
- ❯ The distance and time prior to the stop at which the announcement can be made ("trigger zone") is configurable
- ❯ The system can be configured to announce the next 2 or 3 stops as needed.
    - ❯ Example: "Approaching 3rd/Figueroa, followed by 4th/Figueroa"
- ❯ The system will automatically manage on-route and off-route situations as they happen pausing the announcements when a vehicle departs from the designated route.

Unique AVAS Capabilities

While we always strive to use off-the-shelf hardware, our stop annunciator was previously the one exception. GMV Syncromatics went through an extensive period of research and we found a commercially available annunciator that we knew would give agencies the tools they need with the level of performance we require of our components. The Textspeak hardware is fully integrated into our system and will be forward-compatible with all additional system components (VOIP, Infotainment, reporting/performance, etc…).

Since the GMV Syncromatics AVA system is tightly integrated with a full understanding of a transit agency's routes, stops, schedules, and other CAD/AVL functions, we can offer a superior Annunciator experience on the bus.

Capabilities that set GMV Syncromatics AVAS apart:
- When a bus approaches an interlining point, such as a transit center, we know that the announcements for the inbound trip will correspond to Route A, but the outbound trip will correspond to Route B. Our system will make the correct announcement even when there are many routes serving the same stop, and even when a bus is changing routes.
- Simple GPS only based systems can make the mistake of announcing bus stops that are on the wrong side of the street because based on a raw GPS measurement, the bus IS within the designated trigger zone. GMV Syncromatics knows which route the bus is on, what direction it is headed, and what the next stop is supposed to be, so we only announce the correct stop regardless of proximity to "other" trigger zones.
- Some Annunciators require buses to approach a stop from a certain angle to trigger the announcement, but this can be impractical at large transit centers with multiple entrances and exits. GMV Syncromatics can define the entire transit center as a stop zone so the announcements will work regardless of which path a bus takes.
- Announcements can be programmed remotely and sent to buses in a matter of minutes, even if those buses are currently on route. There is never physical uploading or voice recording required.
- The SyncSPEAK Annunciator will continue to work correctly even in cellular dead zones. The text-to-speech engine runs on the MDT, so it does not need to have server connectivity to play each announcement. GPS satellite connectivity generally remains even when cellular service does not, and the MDT will continue to perform in an ADA-compliant manner even within those cellular dead zones.

Text to Speech Software Engine

GMV Syncromatics AVAS product relies on industry leading text to speech technology to accurately and reliably render your text announcements into natural sounding speech on the bus. This underlying technology is provided via license by NeoSpeech, the industry leader in text to speech processing.

NeoSpeech was founded over a decade ago by two PhD speech engineers—one from Stanford University and the other from Carnegie Mellon University—who were dissatisfied with the poor quality in speech synthesizers. Seeing no other alternatives, they created NeoSpeech as the standard for natural sounding, articulate voices that rival human speech.

While many text-to-speech applications suffer from poor quality announcements that sound very robotic and disengaged, the NeoSpeech platform provides for highly naturalistic speech quality. NeoSpeech uses a process called Unit Selection Synthesis (USS). The process starts on both ends— voice database building language text processing —that meets in the middle to produce speech. But for purposes of understanding, we're going to break down into a simple 6 step process to show you how we create such high quality speech.

Today, NeoSpeech is a leading text-to-speech technology company based in Santa Clara, California with more than 1,000 enterprise customers spanning over a range of industries—telecommunications, education, announcement systems, etc.—and applications—desktop, server, and embedded.
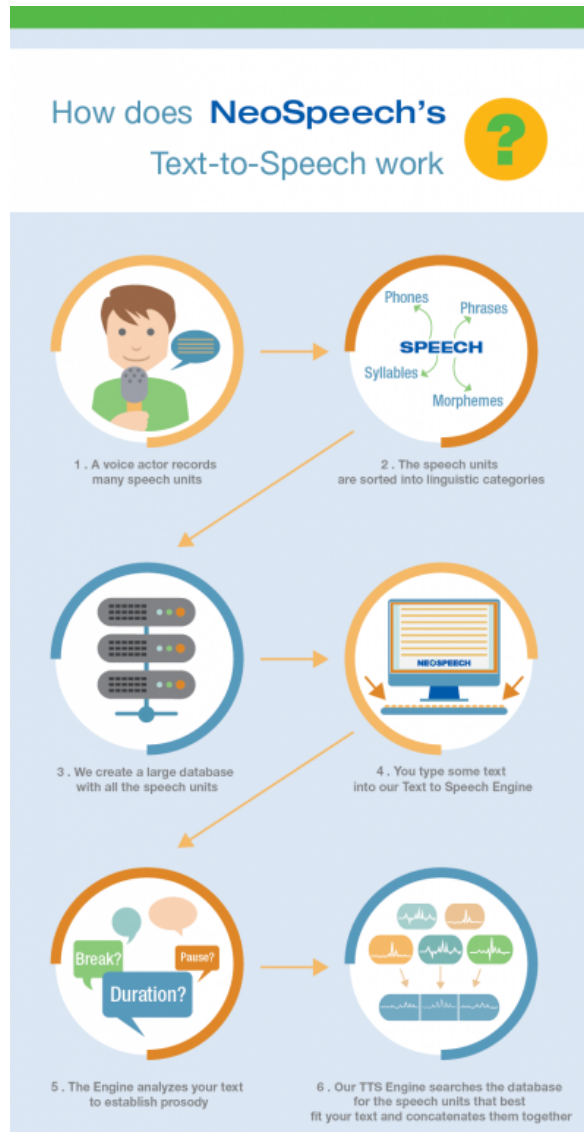
NeoSpeech provides natural sounding voices in a variety of languages, which GMV Syncromatics will begin integrating in the next year.

Take the text to speech quality for a test drive at www.neospeech.com -- a screenshot of the custom test widget is below.

2.Price Proposal

2-1. Pricing Notes

- The pricing provided below is derived directly from the optional pricing in the service contract between GMV Syncromatics and the City of Norman.

- There are no fees for the listed services beyond what is shown in this proposal. These costs include everything necessary to deploy the system including all GMV Syncromatics staff time for planning, installation, training, and support.

- The base hardware prices include a 2-year standard warranty on the OpenMDT Plus system, and a 1-year standard warranty on all other hardware at no additional cost. Extended warranties are available as optional items for up to 5 years total.

- Prices are provided without any applicable sales/use tax.

- Any future fleet replacements can swap system hardware from an old bus to a new bus, incurring only the equipment removal/installation charges.

- Optional pricing is included to equip the 3 Gillig buses that do not have GMV Syncromatics hardware, for fleet uniformity.

- During the course of the hardware upgrade, GMV Syncromatics' field technicians and engineers will thoroughly evaluate the rest of the hardware installed and test it for functionality.

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Quote

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310-728-6997, sales@gmvsync.com

Date	May 11, 2020
Quote #	2020 051123
Valid	60 days
Expires	July 10, 2020
Account Manager	Jeff Hunter
Phone	213-328-5471
Email	jeff@gmvsync.com

Person	Taylor Johnson
Client	City of Norman
Email	taylor.johnson@normanok.gov
Phone	405-217-7761
Tax Rate	n/a - To be assesd upon invoice
Project	Fleet Hardware Upgrade, 3 Gillig Installation

LN	Note	Item	Qty	Price Ea	Tax	Capital	Annual
		OpenMDT Plus Upgrade					
	a	Hardware, OpenMDT Plus	8	$ 3,315		$ 26,520	$ -
		Credit, Buyback, MDT-600	8	$ (300)		$ (2,400)	$ -
		Installlation, OpenMDT Plus	8	$ 927		$ 7,416	$ -
		AVAS Upgrade					
	b	Hardware, Textspeak AVAS	8	$ 1,825		$ 14,600	$ -
		Credit, Buyback, IBA AVAS	8	$ (150)		$ (1,200)	$ -
		Installation, Textspeak AVAS	8	$ 950		$ 7,600	$ -
	b	Hardware, Internal LED Sign	8	$ 1,495		$ 11,960	$ -
		Installation, Interior LED Sign	8	$ 400		$ 3,200	$ -
		"Bus in a Box" Training Aid					
	a	Hardware, OpenMDT Plus	2	$ 3,315		$ 6,630	$ -
	b	Hardware, Textspeak AVAS	2	$ 1,825		$ 3,650	$ -
	b	Hardware, Interior LED Sign	1	$ 1,495		$ 1,495	$ -
	b	Hardware, IRIS APC, 2 Door	0	$ 3,415		$ -	$ -
		Annual Service Fee, Cellular Data	0	$ 225		$ -	$ -
		Spare MDT Training Aid					
		Hardware, OpenMDT Plus	0	$ 3,315		$ -	$ -
		Annual Service Fee, Cellular Data	0	$ 225		$ -	$ -
		3 Gillig Bus (703-705) - Option					
		OpenMDT Plus					
	a	Hardware, OpenMDT Plus	3	$ 3,315		$ 9,945	$ -
		Installation, OpenMDT Plus	3	$ 927		$ 2,781	$ -
		Vehicle and System Licenses, CAD/AVL	3	$ 975		$ 2,925	$ -
		Annual Service Fee, CAD/AVL	3	$ 844		$ -	$ 2,532
		AVAS					
	b	Hardware, Textspeak AVAS	3	$ 1,825		$ 5,475	$ -
		Installation, Textspeak AVAS	3	$ 950		$ 2,850	$ -
	b	Hardware, Interior LED Sign	3	$ 1,495		$ 4,485	$ -
		Installation, Interior LED Sign	3	$ 400		$ 1,200	$ -
		Vehicle and System Licenses, AVAS	3	$ 725		$ 2,175	$ -
		Annual Service Fee, AVAS	3	$ 120		$ -	$ 360

			Qty	Unit Price		Total Capital	Annual
		APC					
b		Hardware, IRIS APC, 2 Door	3	$ 3,415		$ 10,245	$ -
		Installation, IRIS APC, 2 Door	3	$ 965		$ 2,895	$ -
		Vehicle and System Licenses, APC	3	$ 695		$ 2,085	$ -
		Annual Service Fee, APC	3	$ 108		$ -	$ 324
		Headsign Integration					
b		Hardware, Headsign Integration	3	$ 295		$ 885	$ -
		Installation, Headsign Integration	3	$ 185		$ 555	$ -
		Project Management					
		Project Management - Full Fleet MDT Upgrade	1	$ 7,200		$ 7,200	$ -
		Project Management - Full Fleet MDT and AVAS Upgrade	1	$ 11,300		$ 11,300	$ -
		Project Management - 3 Gillig (703-705)	1	$ 6,100		$ 6,100	$ -

Base System Upgrade (MDT): Total Capital Costs $ 38,736
Total Annual Cost $ -

Expanded System Upgrade (MDT + AVAS): Total Capital Costs $ 78,996
Total Annual Cost $ -

"Bus in a Box" Training Aid Total Capital Costs $ 11,775
Total Annual Cost $ -

ITS Deployment - 3 Gilligs (703-705): Total Capital Costs $ 54,601
Total Annual Cost $ 3,216

Total - MDT + AVAS Hardware Upgrade, Bus in a Box and 3 Gillig Deployment **Total Capital Costs $ 145,372**
Total Annual Cost $ 3,216

NOTES
a Includes 2 year equipment warranty in purchase price.
b Includes 1 year equipment warranty in purchase price.

Prices do not include applicable local sales and use tax. Taxes will be assessed at time of invoice