

Using GTFS Networks (Transit & Rail Committee)

presented by
David Schmitt, AICP

December 8, 2016





- Overview of GTFS networks
- The GTFS subcommittee
- Using GTFS in FSUTMS
- In-depth assessment of known GTFS methods

GTFS Networks



- General Transit Feed Specification

- A series of text files using a standardized format to describe, in full detail, the transit system
- Publicly available from transit agencies or the Florida Transit Data Exchange

Contents

- agency.txt
- calendar.txt
- calendar_dates.txt
- fare_attributes.txt
- fare_rules.txt
- feed_info.txt
- frequencies.txt
- routes.txt
- shapes.txt
- stops.txt
- stop_times.txt
- transfers.txt
- trips.txt

Broward County Transit

Map Satellite

trips.txt route_id=BCT22 service_id=15MARmuwtf trip_id=15MAR4336126 block_id=b-22-01 shape_id=15MAR_220258
routes.txt route_long_name= route_type=3 route_text_color=FFFFFF route_color=BF83B9 agency_id= route_id=BCT22 route_url= rou...

Trip 15MAR4336210 starting 10:20:00

GTFS Network Detail



- GTFS information is used for mobile pathfinding apps because of its high fidelity:
 - Latitude / longitude of each transit stop or station
 - List of every bus or train “run”
 - Stop to stop travel times for each bus or train “run”
 - Reflects differences in service across weekdays, weekends and holidays

TDM / GTFS Network Comparison



Component	Travel Demand Model	GTFS
Stops / station location	Stops manually aggregated to roadway network topology	Latitude / longitude of each stop
Level of service	Average headway per time period	Time tables include the entire “time table” of each bus or train “run”; no aggregation
Existing year travel times	Calibrated end-to-end travel times	Coded stop to stop travel times
Transfer time	“Half the headway” of any connecting route	Depends on time table; could miss transfer entirely
Service day	Average weekday	Can reflect all 7 days/week, including special holiday service
Update / maintenance	Manually updated as needed by modeling staff	Updated 2-3 times per year by some transit agencies

Some GTFS Limitations



- GTFS networks are very detailed, but this level of detail is not generally available in planning stages
 - GTFS is precise: stop-to-stop coding of travel times, precise location of stops, enumeration of individual bus runs
 - Planning studies cannot be as precise: end-to-end travel times, and average frequencies/headways of changed/new routes by time period
- No direct interaction with auto network: transit speeds insensitive to changes in auto congestion
- GTFS coding is cumbersome (currently)
 - No freely available GTFS visual editor, although visualizers exist
- Non-standard use of transit fare specifications



- Purpose: to explore the potential to use GTFS networks in FSUTMS travel demand models
 - The prevalence and easy access of up-to-date GTFS networks makes them an attractive alternative to the substantial coding and maintenance effort needed for FSTUMS transit networks
 - STOPS modeling in Florida is now prevalent; STOPS uses GTFS networks to estimate transit ridership (not travel demand software networks)

GTFS Subcommittee



- Jeanette Berk
- Sheldon Harrison
- Ashutosh Kumar
- Jason Learned
- Santanu Roy
- Michael Rose
- Krishnan Viswanathan

- David Schmitt, subcommittee chair
- Scott Seeburger, Transit & Rail Committee chair

Possible GTFS Implementation Tracks



Implementation Track	FSUTMS Network	FSUTMS Pathbuilding / Skims	FSUTMS Assignment
<p>#1 Convert GTFS to FSUTMS networks</p> <p><i>Sub-committee recommendation on initial direction</i></p>	<p>Convert GTFS network to FSUTMS format using automated or semi-automated process [requires new procedure]</p>	<p>Use existing FSUTMS procedures (no change)</p>	<p>Use existing FSUTMS procedures (no change)</p>
<p>#2 Use GTFS Procedures within FSUTMS</p>	<p>Use GTFS format, but automate update of auto speeds from FSUTMS [requires new procedure]</p>	<p>Use GTFS procedures, converting results to TAZ-to-TAZ skims for mode choice [requires procedures to reconcile lat/long to zones]</p>	<p>Use GTFS procedures, with results converted to text or other formats [requires procedures to reconcile lat/long to zones]</p>



- Subcommittee identified two methods that may advance the use of GTFS networks in FSUTMS:
 - FSUTMS software GTFS import utility/functionality
 - TBEST's GTFS import and edit functionality
- Unknowns
 - How well each tool works for differently-sized transit agencies
 - How these methods could advance the use of GTFS in FSUTMS models

Assessment of GTFS Methods



1. Import Test. For both the GTFS utility and TBEST, perform the following steps for example networks from small-, medium- and large-sized Florida cities:
 - Import the GTFS network and convert it directly to FSUTMS software binary transit network format
 - Manually review most of the routes for consistency and applicability to the FSUTMS travel model. Items of major concern are:
 - The aggregation of physical stops as it relates to the fidelity of the zonal and roadway network,
 - The aggregation of bus runs into an average service frequency for each time period in the FSUTMS models,
 - Matching the bus routing to the correct roadway in the FSUTMS network, and
 - Application of the GTFS bus travel times to the FSTUMS transit network.



2. Edit/Application Test

- Manually correct or modify the imported transit network to improve its accuracy for FSUTMS travel model applications.
- Run the now-corrected transit network within the FSUTMS travel model. Ensure that the FSUTMS transit components run accurately

3. GTFS Editing / Export Test (TBEST only)

- Edit the GTFS network by making minor route changes.
- Export the altered network to GTFS format.
- Using STOPS or GIS, compare transit travel time changes between the original and altered networks to verify that the only changes are directly related to the minor route changes.

Going Forward



- We will...
 - Identify GTFS network manipulation/editing tools as they develop and evolve
 - Monitor progress of GTFS pathbuilding and assignment algorithms
 - Monitor other states' attempts to incorporate GTFS information in their regional planning models
- Changes in technology, software and algorithms may accelerate need for implementing GTFS procedures within FSUTMS



Thank you!