MPO SURVEY OF NETWORK MANAGEMENT PRACTICES

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Travel Forecasting and Emission Analysis
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Presentation Outline

- Background
- List of MPOs Targeted for the Survey
- Survey Questionnaires
- Summary of Survey Results
- COG/TPB's Network Management Practices
- Findings and Conclusions

Background

- Network management in support of COG/TPB's travel demand modeling processes
- Development of COG/TPB's Next-Generation (Gen3) Model

List of MPOs Targeted for the Survey

Metropolitan Planning Organization	2010 Population
1. Southern California Association of Governments (SCAG)	18,051,203
2. New York Metropolitan Transportation Council (NYMTC)	12,367,508
3. The Chicago Metropolitan Agency for Planning (CMAP)	8,454,538
4. Metropolitan Transportation Commission (MTC)	7,150,828
5. North Jersey Transportation Planning Authority (NJTPA)	6,579,801
6. North Central Texas COG (NCTCOG)	6,417,630
7. Houston-Galveston Area Council (H-GAC)	5,892,002
8. Delaware Valley Regional Planning Commission (DVRPC)	5,626,318
9. National Capital Region Transportation Planning Board (NCRTPB)	*5,068,737*
10. Atlanta Regional Commission (ARC)	4,818,052
11. Southeast Michigan COG (SEMCOG)	4,703,593
12. Maricopa Association of Governments (MAG)	4,055,281
13. Puget Sound Regional Council (PSRC)	3,690,866
14. Boston Region MPO	3,159,512
15. San Diego Association of Governments (SANDAG)	3,095,271
16. Metropolitan Council	2,906,684
17. Denver Regional COG (DRCOG)	2,827,082
18. Baltimore Regional Transportation Board (BRTB)	2,684,661
19. Southwestern Pennsylvania Commission (SPC)	2,574,953
20. East-West Gateway Council of Government (EWGCOG)	2,571,327
21. Sacramento Area COG (SACOG)	2,274,557
22. Portland Area Comprehensive Transportation System (METRO)	1,499,844
23. Mid-Ohio Regional Planning Commission (MORPC)	1,436,334

Survey Questions

- The survey questionnaire contained 14 questions which were grouped into the following two categories:
  - Questions on travel demand forecasting software, such as:
    - What travel demand forecasting software do you use?
    - Do you also use the same software for managing your networks or do you use some other software?
  - Questions on network management software, such as:
    - Please provide a basic description of the processes and software that you use to manage your transportation networks.
    - Why did you choose the software that you use?
    - What are the strengths and weakness of the approach that you use to manage your transportation networks?

Survey Procedure

- Survey questions were sent out to the 23 MPOs in the list in May 2019
- TPB staff followed up with MPOs that did not respond to the survey in a three-week period by email or phone call
- 12 out of 23 MPOs took the survey by August 2019

Summary of Survey Results

	Software		Frequency to Update		Multi-Year Network Editing?	Integrated Scenario Mgmt.	Topological Integrity (Highway/Transit)
	Travel Demand	Network Management	Model	Network			
SCAG	TransCAD	TransCAD	RTP/4 * FTIP/2**	On-going Process	N	N	Yes
NYMTC	TransCAD/ Customized	TransCAD/GIS DK	Yearly	Yearly	Y	Subnetworks Merger	No
CMAP	EMME	ArcGIS	N/A	Twice a Year	Y	Y	Yes
NJTPA	Cube	Cube	Two Year	Two Year	N	Y	Yes
NCTCOG	TransCAD	TransCAD	N/A	N/A	N	N	Yes
DVRPC	PTV VISUM	VISUM/ArcGIS	Five Year Cycle	Five Year Cycle	Y	Y	Yes
MWCOG/ NCRTPB	*Cube*	*ArcGIS*	*Yearly*	*On-Going Process*	*Y*	*Y*	*Yes*
SEMCOG	TransCAD	TransCAD	N/A	Whenever Needed	Y	N	No
Boston Region MPO	TransCAD	TransCAD	N/A	On-Going Process	Y	N	Yes
SANDAG	TransCAD > EMME	ESRI ArcInfo	N/A	On-Going Process	Y	N	Yes
BRTB	Cube	ArcGIS	Yearly	Yearly	N	Y	No
SPC	Cube	Cube	N/A	On-Going Process	N	N	No
EWGCOG	Cube	ArcGIS	Yearly	at least once a year	Y	N	Yes

* RTP/4 = Regional Transportation Plan is updated every four years

** FTIP/2 = Federal Transportation Improvement Program is updated every two years

Summary of Survey Results

- Based on the travel demand modeling software, the 12 surveyed MPOs can be divided into four user groups; each user group uses different network management software and processes.
  - CUBE User Group
    - Five MPOs (NJTPA, BRTB, SPC, EWGCOG, COG/TPB)
    - Network management software split between ArcGIS and CUBE
  - TransCAD User Group
    - Six MPOs (SCAG, NYMTC, NCTOG, SEMCOG, Boston, SANDAG)
    - Network management software: TransCAD
  - EMME User Group
    - Two MPOs (CMAP, SANDAG)
    - Network management software: ArcGIS
  - VISUM User Group
    - One MPO (DVRPC)
    - Network management software: ArcGIS

Three Network Management Approaches

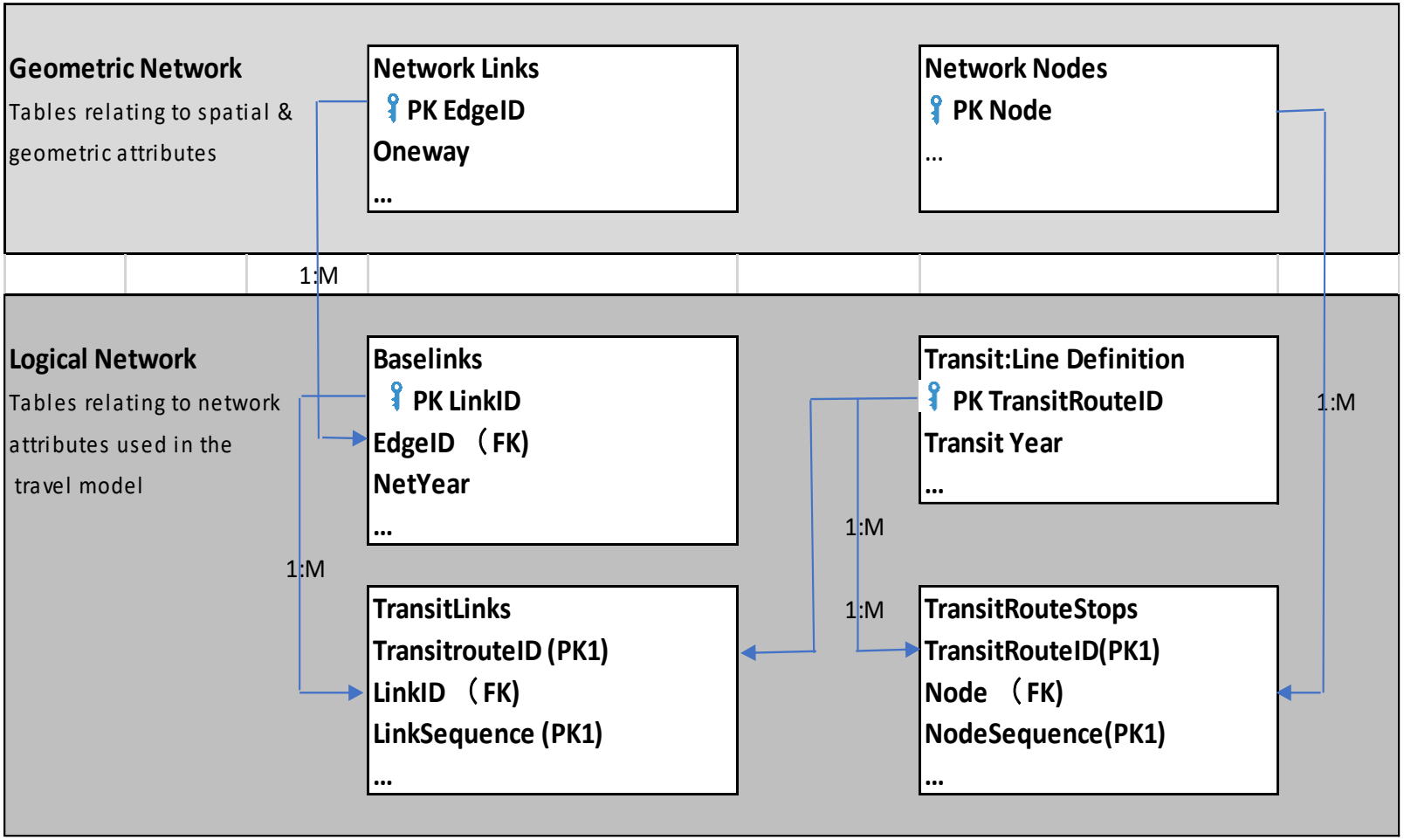
	Operation		Database		Customized Tool
	Simple	Complex	Dedicated	Integrated	
Cube	X		X		
ArcGIS		X		X	X
TransCAD		X		X	X

COG Practice

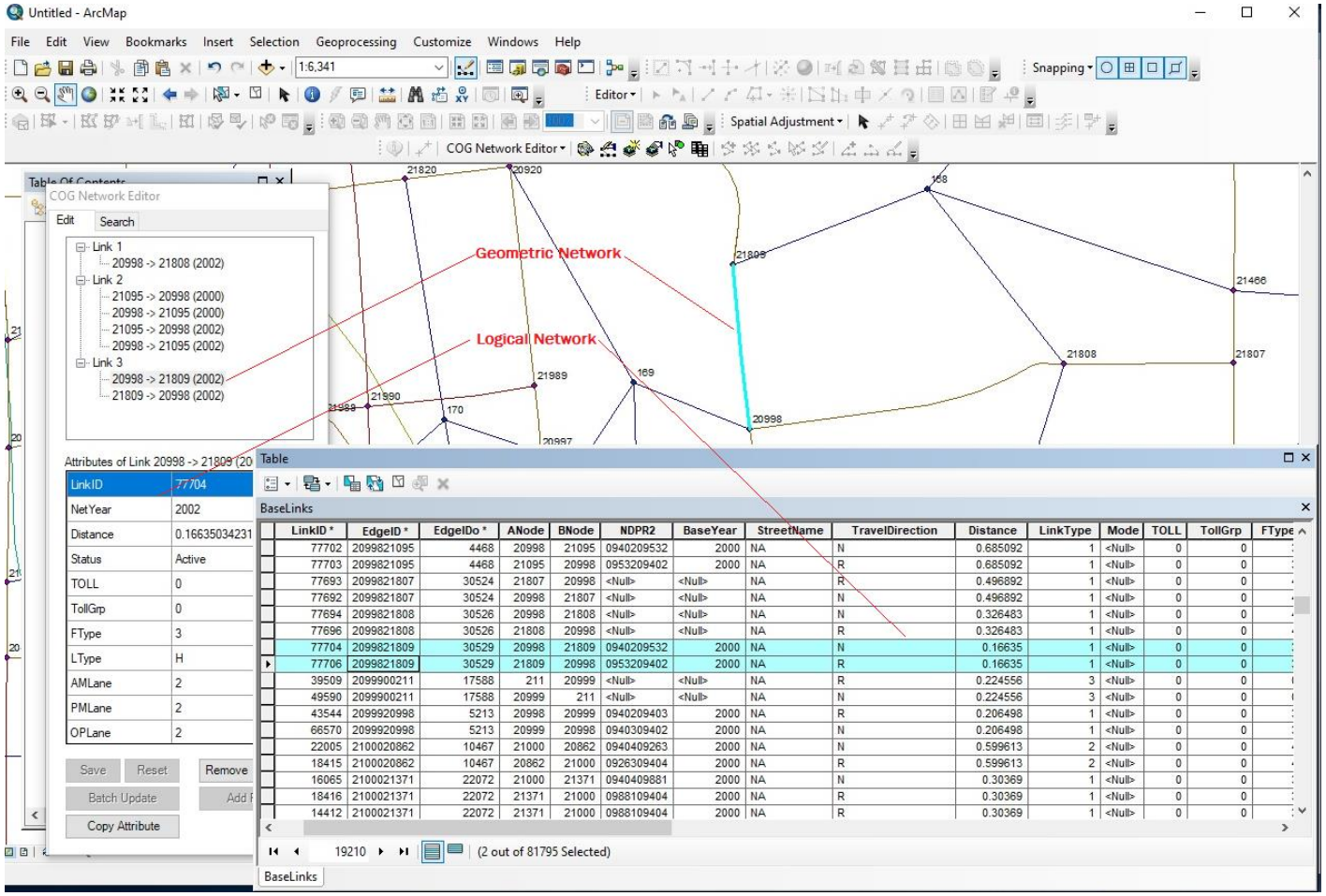
- COGTools (COG Network Editing Tools) software is designed to facilitate network editing and network database management.

- Functions of COGTools could be classified into three categories:
  - Editing Networks
    - Highway Link Editing
      - Create New Link
      - Edit Link
      - Delete (Retire) Link
      - Split Link
      - …
    - Transit Route Editing
      - Edit Transit Route
      - Extend Transit Route
      - Shrink Transit Route
      - Modify Running Time and Head Way
      - …
  - Exporting Networks (Highway and Transit)
    - Cube Voyager Network File, with TRNBUILD-Format Transit Network
    - Personal GDB
    - Cube Voyager Network File, with Public Transport (PT)-Format Transit Network
  - Generating Dynamic Layers
    - Base Network
    - Travel Direction Network
    - Transit Network

COG Practice: Geo-Database



COG Practice: Geometric and Logical Networks



LinkID *	EdgeID *	EdgeIDo *	ANode	BNode	NDPR2	BaseYear	StreetName	TravelDirection	Distance	LinkType	Mode	TOLL	TollGrp	FType
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77703	2099821095	4468	21095	20998	0953209402	2000	NA	R	0.685092	1	<Null>	0	0	
77693	2099821807	30524	21807	20998	<Null>	<Null>	NA	R	0.496892	1	<Null>	0	0	
77692	2099821807	30524	20998	21807	<Null>	<Null>	NA	N	0.496892	1	<Null>	0	0	
77694	2099821808	30526	20998	21808	<Null>	<Null>	NA	N	0.326483	1	<Null>	0	0	
77696	2099821808	30526	21808	20998	<Null>	<Null>	NA	R	0.326483	1	<Null>	0	0	
77704	2099821809	30529	20998	21809	0940209532	2000	NA	N	0.16635	1	<Null>	0	0	
77706	2099821809	30529	21809	20998	0953209402	2000	NA	R	0.16635	1	<Null>	0	0	
39509	2099900211	17588	211	20999	<Null>	<Null>	NA	R	0.224556	3	<Null>	0	0	
49590	2099900211	17588	20999	211	<Null>	<Null>	NA	N	0.224556	3	<Null>	0	0	
43544	2099920998	5213	20998	20999	0940209403	2000	NA	R	0.206498	1	<Null>	0	0	
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22005	2100020862	10467	21000	20862	0940409263	2000	NA	N	0.599613	2	<Null>	0	0	
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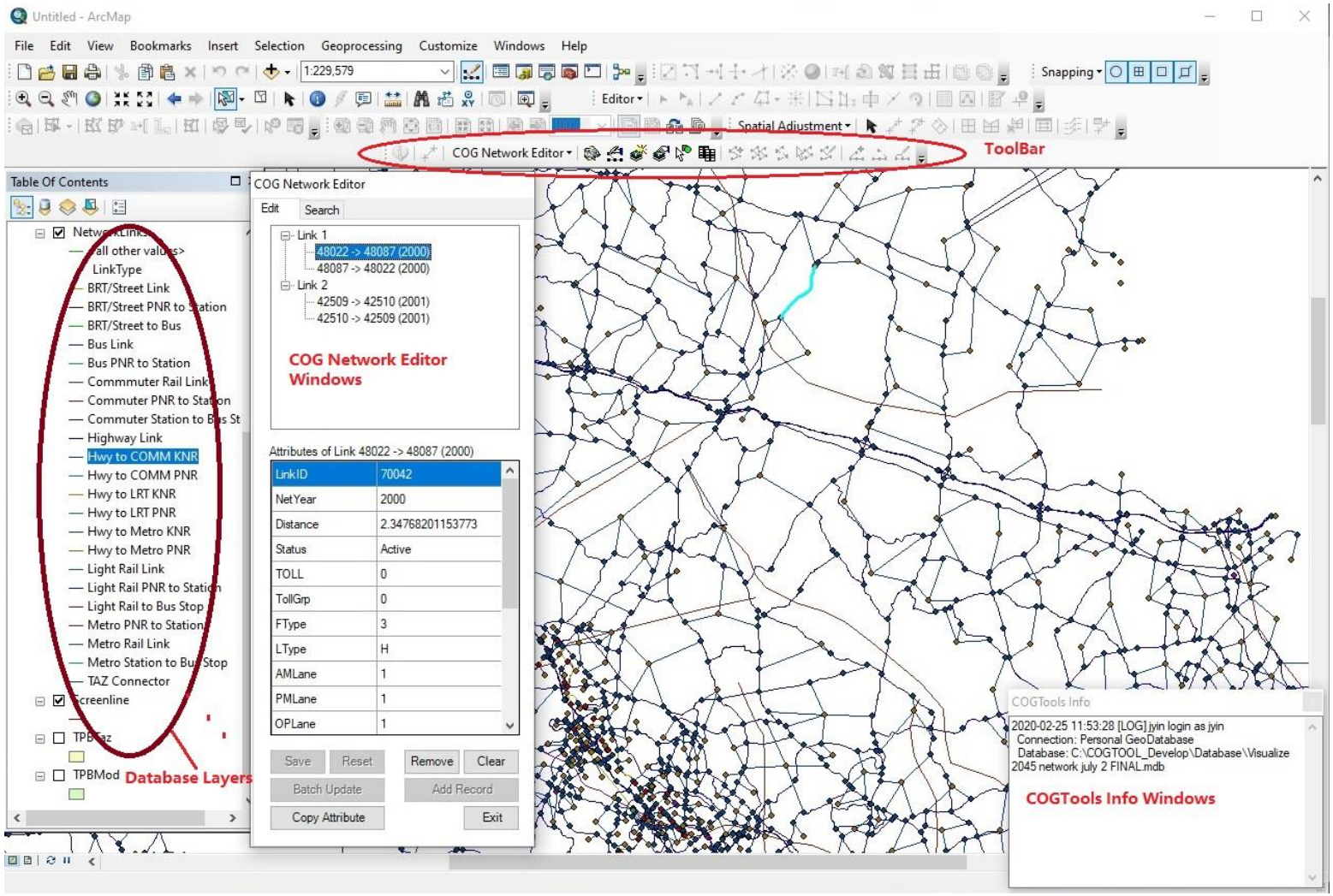
14412	2100021371	22072	21371	21000	0988109404	2000	NA	R	0.30369	1	<Null>	0	0	

COG Practice: COGTools Components

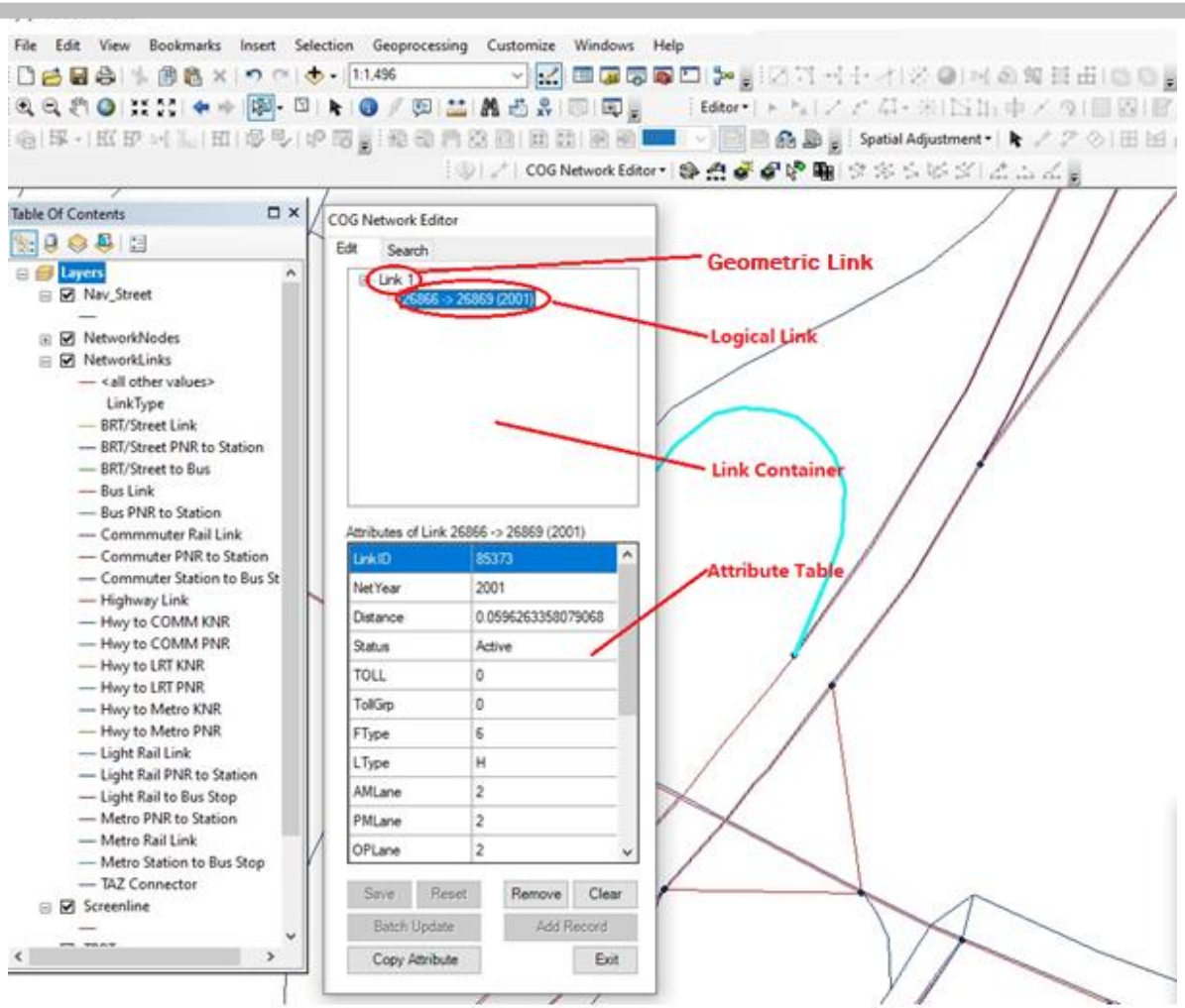
- There are two main Graphic User Interface (GUI) components in the COGTools
  - Toolbar
  - Network Editor Windows (Highway and Transit)

- Some other GUI components
  - COGTools Info Window
  - Export Network Dialog Window
  - Instructional Dialogs shown in editing operations

COG Practice: COGTools Snapshot

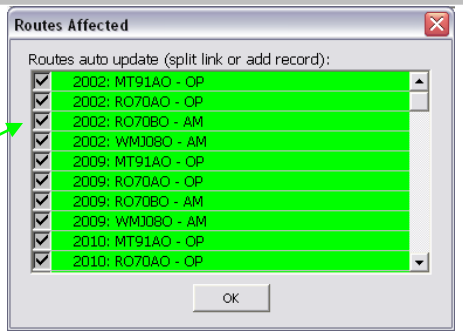


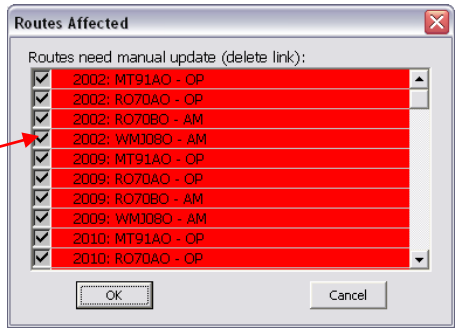
COG Practice: COGTools Highway Editor Windows

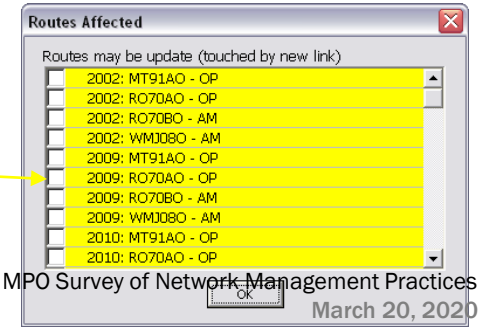


COG Practice: Transfer of Highway Link Edits to Transit Network

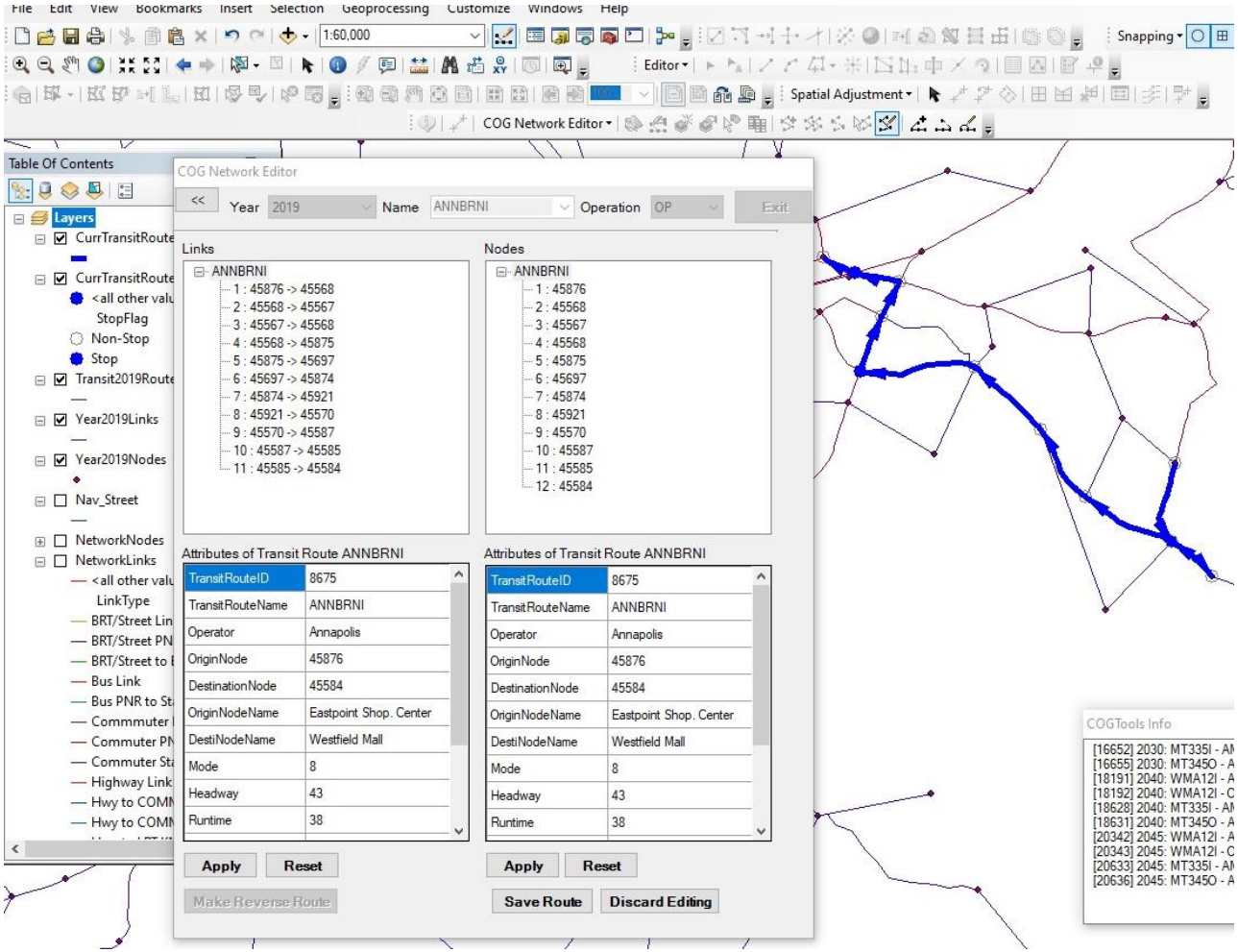
- When editing a link of a highway network (e.g. add and split link), if one or more transit routes are associated with the link, there will be a transfer of the edits to this link to associated transit routes
- Four editing operations could initiate this transfer:
  - Create New Link
  - Add Record
  - Delete Link
  - Split Link
- Before the transfer, a dialog will pop up to inform the user all the affected routes
- Color coded windows indicate different actions
  - Green: initiated by splitting a link (including links split by new link) or by adding a record; affected routes will be automatically updated, i.e., no manual transfer is needed
  - Red: initiated by deleting a link; affected transit routes have to be manually updated
  - Yellow: initiated by adding a link that reuses old node(s); affected routes have to be manually updated







COG Practice: COGTools Transit Network Editor Windows



Findings and Conclusions

- Network management is a complex process
- 12 surveyed peer MPOs use three different network management software to serve different needs
- No universal network management tool is available to solve every MPO's problems
- Based on COG/TPB's network management practices, a reliable, customized tool is very useful to manage multi-year, multi-modal network database

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