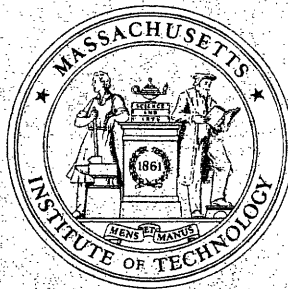


OPERATIONS RESEARCH CENTER

working paper



**MASSACHUSETTS INSTITUTE
OF TECHNOLOGY**

Deterministic Network Optimization

A Bibliography

by
Bruce L. Golden
and
Thomas L. Magnanti

OR 054-76

June 1976

Supported in part by U. S. Department of Transportation (Contract DOT-TSC-1058), Transportation Advanced Research Program (TARP).

In recent years, Network Optimization has grown to be a popular and fruitful area of operations research. T. C. Hu considers this area a new branch of combinatorial mathematics and applied graph theory [GEN18]. The remarkable emergence of this subject is brought to light by examining the one-page bibliography in Graph and Their Uses by O. Ore (1963) where the author states, "The number of books on graph theory is very small." In this report, we present a categorized bibliography on Deterministic Network Optimization which includes a number of books and nearly 700 entries. As the reader might note, most of our citations have appeared since Ore's book was published.

We do not intend to be encyclopedic in this compilation; rather, we have included references which are, for the most part, accessible and substantial. We emphasize algorithms for network optimization and underlying theory. Mathematica [GEN24] and Klvestu and Simpson [GEN19] provide comprehensive bibliographies which emphasize applications.

There are several noteworthy general reference books which should be mentioned. Ford and Fulkerson's monograph [GEN8] is the original reference on the theory of flows in networks. In addition to containing results on static maximal flow and minimal cost flow problems, this source introduces network analysis as a fresh viewpoint for studying purely combinatorial problems. More recently, Frank and Frisch [GEN10] have written a very comprehensive treatment of the theory of networks, entailing both deterministic and probabilistic networks. Garfinkel and Nemhauser [GEN13] cover integer programming, theory and applications. The relationship between integer programming and graphs is emphasized throughout the book. Christofides' [GEN4] new book on graph theory, written by an operations researcher, stresses algorithms for classical operations research network problems. It includes a chapter on matching theory and an in-depth discussion of the Chinese Postman Problem. The excellent survey of deterministic networks by Bradley [GEN2] is also recommended highly.

Network models are important not only because of their direct applicability. In many cases, network optimization problems form subproblems for more complex and general real-world situations. Successful applications of network models include transport of goods, assignment problems, analysis and synthesis of transportation and communication networks, routing of vehicles, traffic equilibrium, equipment replacement, project planning, production and inventory control, optimal capacity scheduling, and a host of others (see Fulkerson [GEN12]).

We have divided our bibliography on deterministic network optimization into several categories in order to make it more readable and valuable to network researchers. These

categories are:

- | | | |
|----------------------|----|---|
| NETWORK
ANALYSIS | A. | General References |
| | B. | Shortest Path Problems and Variants |
| | C. | Network Reliability |
| | D. | Single and Multi-Commodity Flows |
| | E. | Traffic Equilibrium |
| | F. | The Chinese Postman Problem and Matching |
| | G. | Traveling Salesman Problems and Extensions
(Vehicle Routing) |
| NETWORK
SYNTHESIS | H. | Minimal Spanning Trees and Variants |
| | I. | Location of Facilities on a Network |
| | J. | Design of an Optimal Network |
| UNIFYING
TOPICS | K. | Implementation Issues |
| | L. | Complexity Theory |
| | M. | Matroids and Graph Theory |

It should be noted that these categories are not mutually exclusive. On the other hand, we do feel they represent most research areas in Deterministic Network Optimization.

In compiling a bibliography of this nature, we have, of course, benefited from many previous compilations. The books mentioned above have served as general sources. In addition, papers by Assad [MULT1], Francis and Goldstein [LOC24], Glover and Klingman [IMP19], Pierce [SP36], and Wong [DES59] have been useful sources for special topics. The authors welcome suggestions for improving this bibliography and hope that it will serve as a useful reference in this important research field.

Finally, we would like to thank Ross Shachter who designed a computerized system for composing and updating this bibliography.

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AASHTIANI, H., IMP1
ACHIM, C., EQUIL9
ADLER, T., MATR1
AGARWAL, S. K., DES1
AGRAWALA, A., GEN33
AHO, A., COMP1
AMIN, A., REL11
AMIR, A., DES27
ASHOUR, S., TSP1
ASSAD, A., MULT1
AYOUB, J. N., DES2
BAGCHI, A., TSP80
BALAS, E., MULT2
BALINSKI, M. L., CPP1, CPP2, CPP3, CPP4, TSP2, IMP2
BALL, M., REL1
BALLOU, R., LOC1
BANFORD, T., EQUIL38
BANSAL, P., DES3
BARACHET, L., TSP3
BARLOW, R., REL2
BARON, G., MST1
BARR, R., IMP3
BART, P., LOC67
BAUMOL, W., LOC2
BAZARAA, M., SP1
BEALE, E. M. L., MULT3
BEARDWOOD, J., TSP4
BECKENBACH (ed.), E., GEN1
BECKMANN, M. J., EQUIL1, EQUIL2
BELL, D., TSP5
BELLMAN, R., SP2, CPP5, TSP6, LOC3
BELLMORE, M., REL3, REL4, REL17, MULT4, MULT5, TSP7, TSP8, TSP9
BELTRAMI, E., CPP6, TSP10
BENNETT, B., TSP11
BENNETT, H., TSP15
BENNINGTON, G. E., MULT4, MULT6, IMP4
BENTLEY, J., MST2
BERGE, C., CPP7
BERGMAN, L., LOC68
BHATT, K., EQUIL3
BILES, W., TSP12
BILLHEIMER, J., DES4
BLACK, W., MST3
BLATTNER, W., COMP5
BOCK, F., MST4
BODIN, L., CPP6, TSP10, TSP13
BOESCH, F., DES5
BORODIN, A., COMP2
BOYCE, D., DES6
BOZOKI, G., MULT7
BRADFORD, J., TSP12

DANTZIG, G. B., GEN5, SP7, MULT14, MULT15, MULT16, TSP24, TSP25,
TSP26, COMP5, MATR5

DAVIS, P. S., LOC13

DE WERRA, D., CPP11

DEARING, P. M., LOC14

DEMERS, A., COMP21

DENNIS, J. B., MULT17

DERMAN, C., TSP27

DESLER, J. F., CPP10

DIEHR, G., LOC15

DIJKSTRA, E., SP8, MST7

DINIC, E., COMP6

DREYFUS, S. E., SP9, MST8, LOC16

DWYER, P. S., MULT18, MULT19

EASTMAN, W., TSP28

EDMONDS, J., MULT20, CPP12, CPP13, CPP14, CPP15, CPP16, CPP17,
CPP18, CPP19, CPP20, CPP21, MST9, DES15, IMP10, COMP7,
MATR6, MATR7, MATR8, MATR9, MATR10, MATR11

EFFROYMSON, M. A., LOC17

EILON, S., TSP20, TSP21, TSP29

EL-SHAIEB, A. M., LOC20

ELIAS, P., MULT21

ELLWEIN, L. B., LOC18

ELMAGHRABY, S., GEN6

ELSHAFEI, A. N., LOC19

ELSON, D. G., LOC21

ESAU, L., MST10

EULER, L., CPP22

EVEN, S., GEN7, COMP8

FARHI, A., DES6

FEINSTEIN, A., MULT21

FELDMAN, E., LOC22

FELTS, W., TSP51, TSP52

FELZER, A., DES5

FERLAND, J., EQUIL9, EQUIL12

FEW, L., TSP30

FISHER, M., LOC11

FLOOD, M. M., MULT22, TSP31, IMP11

FLORES, B., TSP71

FLORIAN, M., EQUIL9, EQUIL10, EQUIL11, EQUIL12, IMP12

FLOYD, R., SP10, COMP9

FORD, L. R., GEN8, MULT23, MULT24, MULT25, MULT26, MULT27,
MULT28, MULT29, MULT30, DES16, IMP13

FOURDS, L., TSP77

FOX, B., SP11

FRANCIS, R. L., LOC6, LOC14, LOC23, LOC24, LOC25

FRANK, H., GEN9, GEN10, SP12, REL6, REL7, REL36, REL37, REL38,
MULT31, MULT32, LOC26, LOC27, DES12

FRATTA, L., EQUIL13, TSP14

FRIEDMAN, J., MST2

FRISCH (ed.), I., GEN11

FRISCH, I. T., GEN9, GEN10, REL7, REL31, MULT32, MULT33, MULT85,

JOHNSON, J., TSP36
JOHNSON, S., TSP24, TSP25
JOKSCH, H., SP26
JORGENSEN, N. O., EQUIL19
JR., CPP53
JUDGE, G. G., EQUIL34, EQUIL35
KAJITANI, V., MATR18
KANTOROVITCH, L., MULT61, MULT62
KAREL, C., TSP58
KARG, L., TSP50
KARNEY, D., IMP8, IMP16, IMP17, IMP18
KARP, R. M., MULT20, CPP32, CPP34, TSP44, TSP45, TSP46, MST15,
MST16, MST20, IMP10, COMP7, COMP14, COMP22, COMP23
KENNINGTON, J., MULT63
KERNIGHAN, B., TSP57, MATR17
KERSHENBAUM, A., SP23, REL19, REL38, MST6, MST21, MST22, IMP25,
IMP28, IMP29
KHUMAWALA, B. M., LOC43
KIM, W., DES31
KIM, Y., REL20
KIRBY, R., SP30
KISHI, G., MATR18
KIVESTU, P., GEN19
KLEE, V., SP31, COMP24
KLEIN, M., MULT64, TSP27, IMP12
KLEINROCK, L., EQUIL13
KLEITMAN, D. J., MULT65, DES14, DES32, DES33, DES34, DES57,
MATR13, MATR19
KLESSIG, R. W., MULT66
KLINGMAN, D., SP14, MULT42, MULT43, MULT67, MULT68, MST11, MST12,
IMP3, IMP8, IMP16, IMP17, IMP18, IMP19, IMP20, IMP21,
IMP22, IMP30
KNIGHT, U. G. W., DES35
KNUTH, D., GEN20, GEN21
KOOPMANS, T. C., MULT69
KRARUP, J., TSP43
KRAUSE, K., COMP25
KROLAK, P., TSP51, TSP52
KRUSKAL, J., TSP53, MST23
KUEHN, A. A., LOC44
KUHN, H. W., MULT70, MULT71, CPP35, CPP36
KULASH, D., EQUIL20
KUMAR, S., SP40
KUNDU, S., MATR20
KWAN, M. K., CPP37
LANGLEY, R., SP1
LASDON, L., MULT49
LAWLER, E. L., GEN22, TSP54, COMP26, MATR20, MATR21, MATR22
LEBLANC, L. J., EQUIL21, EQUIL22, DES36, DES37
LEGGETT, J., REL21
LEHMAN, A., MATR23
LEHRER, F., LOC22

-68- Deterministic Network Optimization: A Bibliography
Index of Authors

MULVEY, J., IMP32, IMP33
MUNKRES, J., MULT78
MURCHLAND, J. D., REL28, REL29, REL30, EQUIL26, MST24
MURTY, K., CPP41, TSP58
McGUIRE, C. B., EQUIL2
NAPIER, A., SP14, IMP18, IMP21, IMP30
NASH-WILLIAMS, C. S. J. A., MATR27
NEEBE, A. W., LOC28
NELSON, J., TSP52
NEMHAUSER, G. L., GEN13, SP16, SP34, EQUIL23, EQUIL25, TSP9,
TSP42, LOC11
NEWTON, R., TSP60
NGUYEN, H., TSP41, TSP61, IMP24
NGUYEN, S., EQUIL10, EQUIL11, EQUIL12, EQUIL27, EQUIL28
NIJENHUIS, A., GEN26
NILSSON, N., SP19
NORMAN, R. Z., CPP42
OBRUCA, A., TSP62, MST25
OCHOA-ROSSO, F., DES39
ODONI, A. R., LOC51
OLIVER, R. M., GEN27, SP38, EQUIL31
ONAGA, K., MULT79
ORDEN, A., MULT80, MULT106
ORE, O., GEN25
ORLOFF, C., CPP43, TSP63, TSP64, TSP65
PADBERG, M., CPP44
PAN, A., SP45, MST29
PAPE, U., SP35, IMP34
PARIKH, S., REL31
PARKER, R., TSP1, TSP48
PAUL, D., CPP45
PAVLEY, R., SP22, MST17
PEARMAN, A., DES40
PETERSON, E. L., EQUIL18, EQUIL29
PIERCE, A., SP36, TSP66, MST26
PIERCE, J., TSP67
PIERSKALLA, W., EQUIL21
PINNELL, C., EQUIL30, DES41
PLA, J. M., MULT81, IMP35
POHL, I., SP37
POTTS, R. B., GEN27, SP30, SP38, EQUIL31
PRIESS, I., SP18
PRIM, R., MST27
PRITSKER, A., LOC52
PROSCHAN, F., REL2
PULLEYBLANK, W., CPP21, CPP46
QUANDT, R. E., TSP2, DES42
RABIN, M. O., CPP42
RAJALA, J., LOC42
RAMSER, J., TSP26
RAO, M. R., MULT82, LOC28, COMP5
RAO, T., REL25

SKEITH, R., LOC12
SLATTERY, G. T., DES41
SMITH, R., MULT13
SOLAND, R., LOC62
SPEILBERG, K., LOC63, LOC64
SPELLMAN, R., TSP34
SPIRA, P., SP44, SP45, MST29, COMP33
SPOSITO, V. A., EQUIL17
SRINIVASAN, V., IMP36, IMP37
ST. J. A. NASH-WILLIAMS, C., MATR28, MATR29
STAIRS, S., DES54
STANTON, R., SP5
STEARNS, R., TSP72, COMP29
STEENBRINK, P. A., DES55, DES56
STEFANEK, R., EQUIL39
STEIGLITZ, K., DES57
STOCKMEYER, L., COMP12
STOECKER, A., EQUIL17
STOWERS, J. R., DES9
STRICKER, R., CPP39, CPP47
STUTZ, J., IMP8, IMP22, IMP30
SUURBALLE, J., REL34, MST30
SVESTKA, J., TSP75
SHAIN, R. W., LOC55, LOC65, LOC66, LOC68
SWEENEY, D., TSP58
SWEN, G., MST31
SHOVELAND, C., MULT94
SZWARC, W., MULT95, MULT96, MULT97, TSP83
TAKAYAMA, T., EQUIL34, EQUIL35, EQUIL36
TANG, D. T., MULT98, MULT99, MULT100, DES58
TARJAN, R., REL14, REL15, REL35, CPP28, COMP15, COMP34, MATR31
TEITZ, M. R., LOC67
THOMAS, W., TSP60
THOMPSON, G., TSP50, IMP36, IMP37
TILLMAN, F., TSP76
TOMIZAWA, N., MULT101
TOMLIN, J. A., MULT102, MULT103
TORREGAS, C., LOC68
TORRES, W., SP25
TROTTER, L., EQUIL23
TRUSCOTT, W., LOC69
TUCKER, A. W., MULT104, TSP59
TURNER, W., TSP70, TSP77
TUTTE, W. T., CPP48, CPP49, CPP50, MATR32, MATR33, MATR34
TYAGI, M., TSP78
TYNDALL, G., MULT13
ULLMAN, J., COMP1, COMP21
URQUHART, R. J., CPP51
VAN SLYKE, R., REL1, REL19, REL36, REL37, REL38, MST22, IMP29
VAN VALKENBURG, M. E., MULT74
VEGA, J., TSP1
VERBLUNSKY, S., TSP84

-71- Deterministic Network Optimization: A Bibliography
Index of Authors

VERGIN, R., LOC70
VIOLA, P., LOC5
VON NEUMANN, J., MULT105
VOTAW Jr., D. F., MULT106
WAGNER, H. M., MULT107
WAGNER, R. A., MST8, LOC16
WANG, D., DES34
WATSON-GANDY, C., TSP29
WEBB, M., TSP79
WEINBERG, L., MATR3
WEINER, P., TSP80, DES57
WEINTRAUB, A., SP46
WEISCHEDEL, R., DES6
WELLS, M., GEN32
WELSCH, D. J. A., MATR35, MATR36
WENDELL, R. E., LOC71
WHINSTON, A., MULT87, MULT88
WHITE, J. A., LOC25, LOC72
WHITE, L. J., CPP52, MATR37
WHITE, W. W., MULT45, MULT46, MULT109
WHITNEY, H., MATR38
WIGAN, M., EQUIL37, EQUIL38
WILF, H., GEN26
WILKIE, D., EQUIL39
WILKOV, R., REL13, REL39
WILLIAMS, A. C., MULT108
WILLIAMS, K., MST10
WILLIAMS, T., SP47
WILSON, A., EQUIL40
WING, O., REL40, MST32
WINSTEN, C. B., EQUIL2
WIORKOWSKI, J., TSP81
WITZGALL, C., SP13, CPP53, IMP15
WOLFE, P., TSP47, LOC2
WOLLMER, R. D., MULT110
WONG, R., DES59
WOODLAND, A. D., EQUIL36
WREN, A., TSP82
WRIGHT, J., TSP22
YAGED, B., MULT111
YANG, Y., MST32
YAO, A., MST33
YAU, S., REL8
YEE, J., LOC73
YELLOW, P., TSP85
YEN, J., SP48, SP49, SP50, IMP38
ZADEH, N., MULT112, MULT113, DES60, DES61, COMP35, COMP36, COMP37
ZAHN, C. T., CPP53, MST34
ZANGWILL, W. I., MULT114
ZELKOWITZ, M., GEN33
ZEMLIN, R., TSP59
ZIONTS, S., MULT82