Integrated Passenger and Freight Rail Forecast

SCAG Modeling Task Force

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Purpose and Objectives

Purpose

- Fresh look at future passenger and freight rail operations, capacity needs and costs
- Identify strategic projects/infrastructure that mutually benefit public and private rail stakeholders in order to win funding opportunities

Objectives

- Forecast future passenger and freight rail volumes and demand out to 2045/2050 including interim years
- Assess goods movement and intermodal facility capacities
- Identify necessary track capacity improvements with RTC software
- Develop cost estimates
- Develop funding strategies
- Identify strategic corridors to increase grant funding awards

Project Tasks

- Task 1 – Project Management
- Task 2 – Stakeholder Engagement/TAC
- Task 3 – Existing and Future Conditions
- Task 4 – Rail Simulations (Freight Counts)
- Task 5 – Cost Estimate and Funding Strategy
- Task 6 – Shared Use Strategy
- Task 7 – Strategic Corridors
- Task 8 – Final Report and Recommendations

Progress to Date

- Existing and Future Conditions
- Two TAC Meetings
- CTC/Metrolink Meetings
- 2019 Base Year Simulation
- 2028 Simulation
- 2035 Simulation beginning
- Three additional simulations
- Project completion February 2022

Rail Simulations

- 1) 2019 Base Year
- 2) 2028 Metrolink Milestone 1B
- 3) 2035 Metrolink Milestone 2
- 4) 2035 Metrolink Milestone 2 + CA HSR
- 5) 2045 Metrolink Milestone 3 + CA HSR
- 6) TBD

Rail Traffic Controller

What is RTC?

- Rail Traffic Controller™ is a state-of-the-art software tool for dispatching and scheduling trains
- It is based on the familiar Windows™ standard interface
- RTC™ has been designed for use in both real-time and offline-planning mode

RTC offers

- A superior methodology for scheduling and routing trains
- A migration path to network operations software, real-time systems
- Consistency of operation throughout a railroad’s network
- Flexible dispatcher districts depending on traffic levels

RTC's unique network-oriented design can provide system-level solutions

Advantages to this approach are numerous

- ✓ Any track layout can be modeled
- ✓ Yard and terminal capacity become integrated with train schedules
- ✓ Dispatcher and yardmaster activities become better coordinated
- ✓ Better allocate locomotives via integrated TPC Reliance on HP per ton by district would become obsolete

What does RTC do?

- Simulates trains running over a rail network
- Dispatches trains
- Optimizes dispatching and routing of trains to minimize either delay or cost
- Generates train schedules
- Generates train delay reports
- Displays results in high resolution graphics

Components of RTC

- User interface for dispatching trains
- Draw program for creating and modifying networks
- Train Performance Calculator (TPC), which can account for many variables, including different locomotive types
- Advanced and realistic meet-pass logic

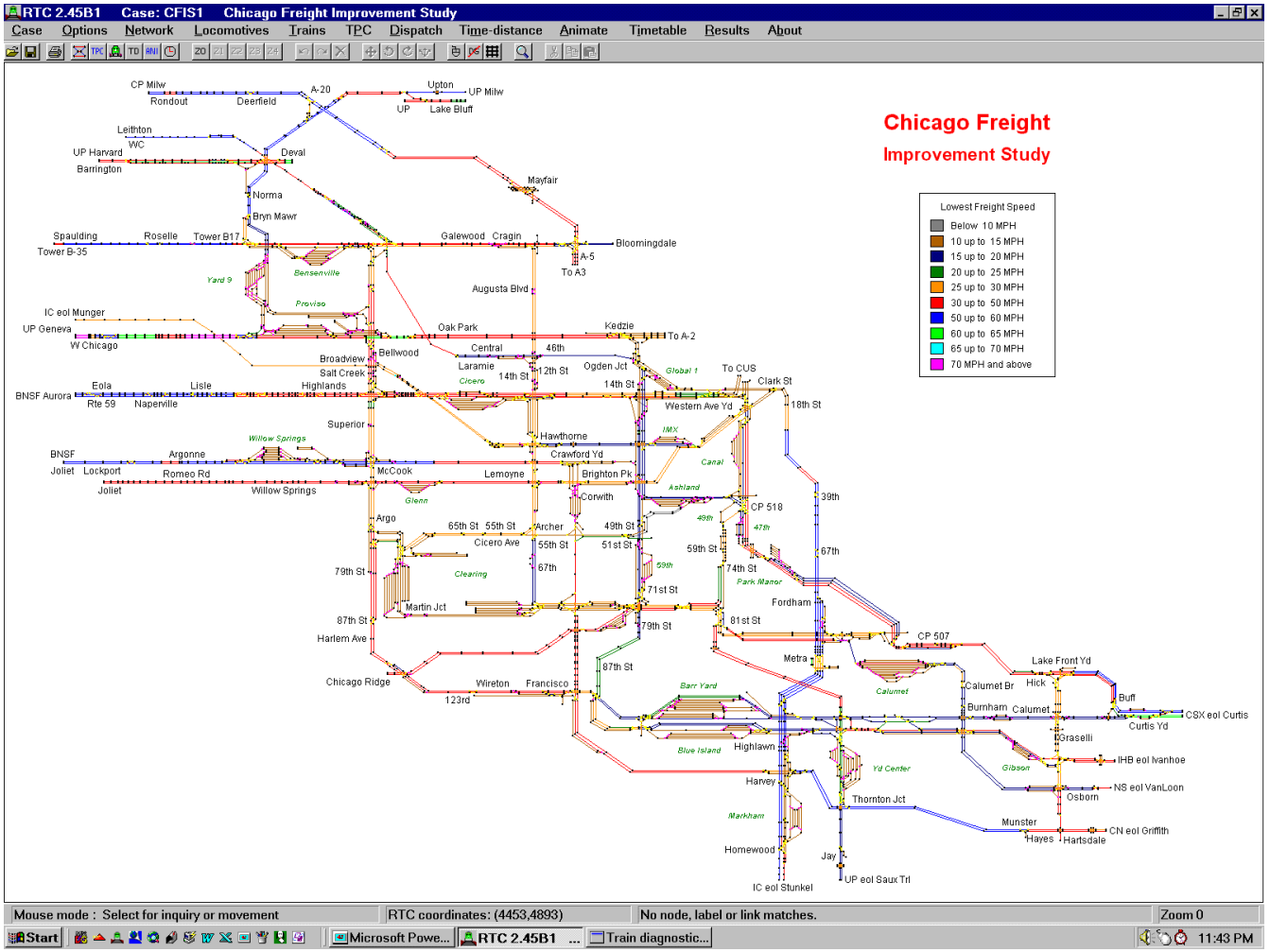
Offline applications of RTC

- Analyze effects of capital projects, such as:
  - ✓ sidings, crossovers and bypass tracks
  - ✓ double tracking
  - ✓ new locomotives by type
- Optimize schedules based on either train delay or cost
- Determine best time to schedule trains
- Determine effects of adding and deleting train service

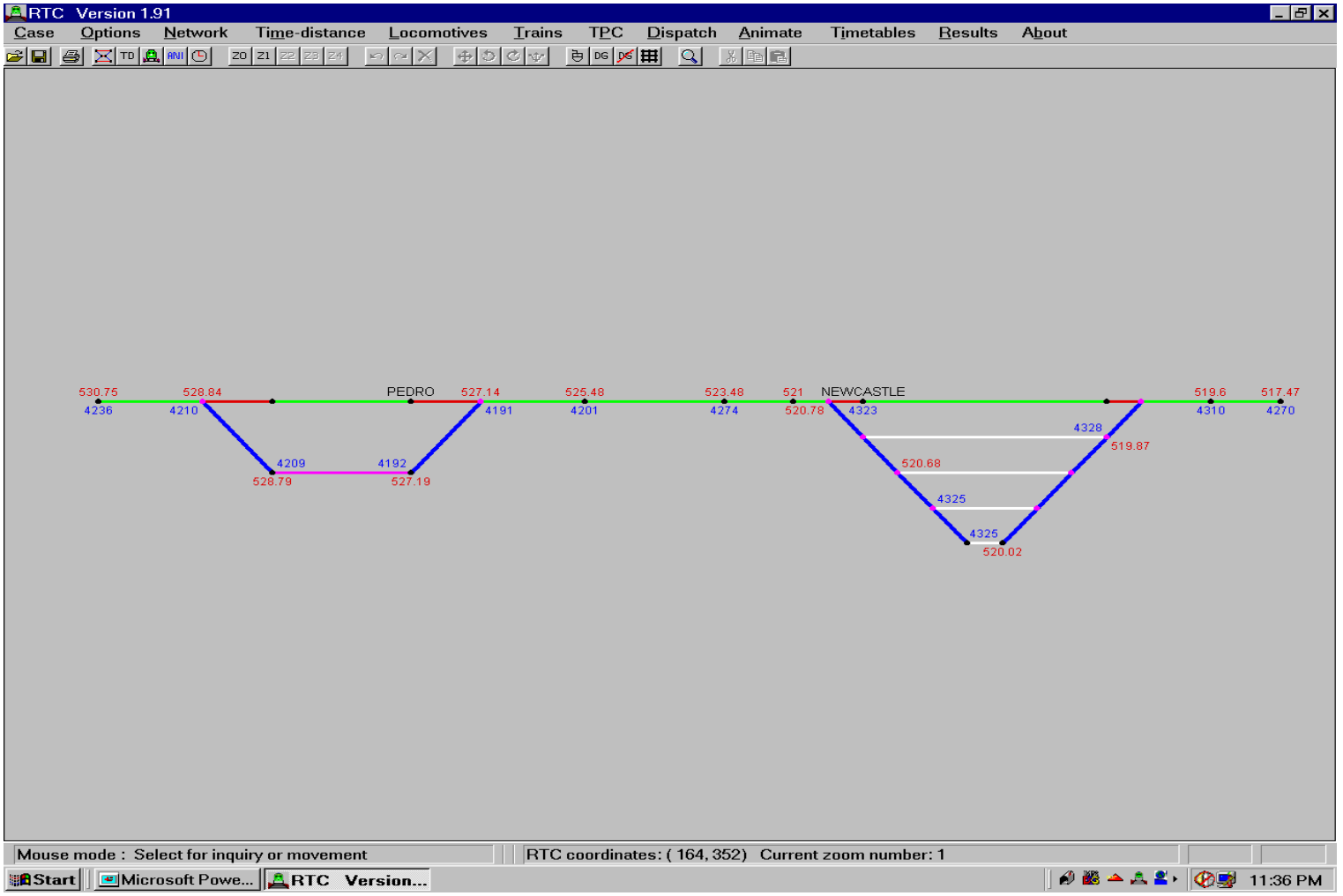
Users of RTC?

- Dispatchers
- Service planners
- MOW planners
- Track engineers

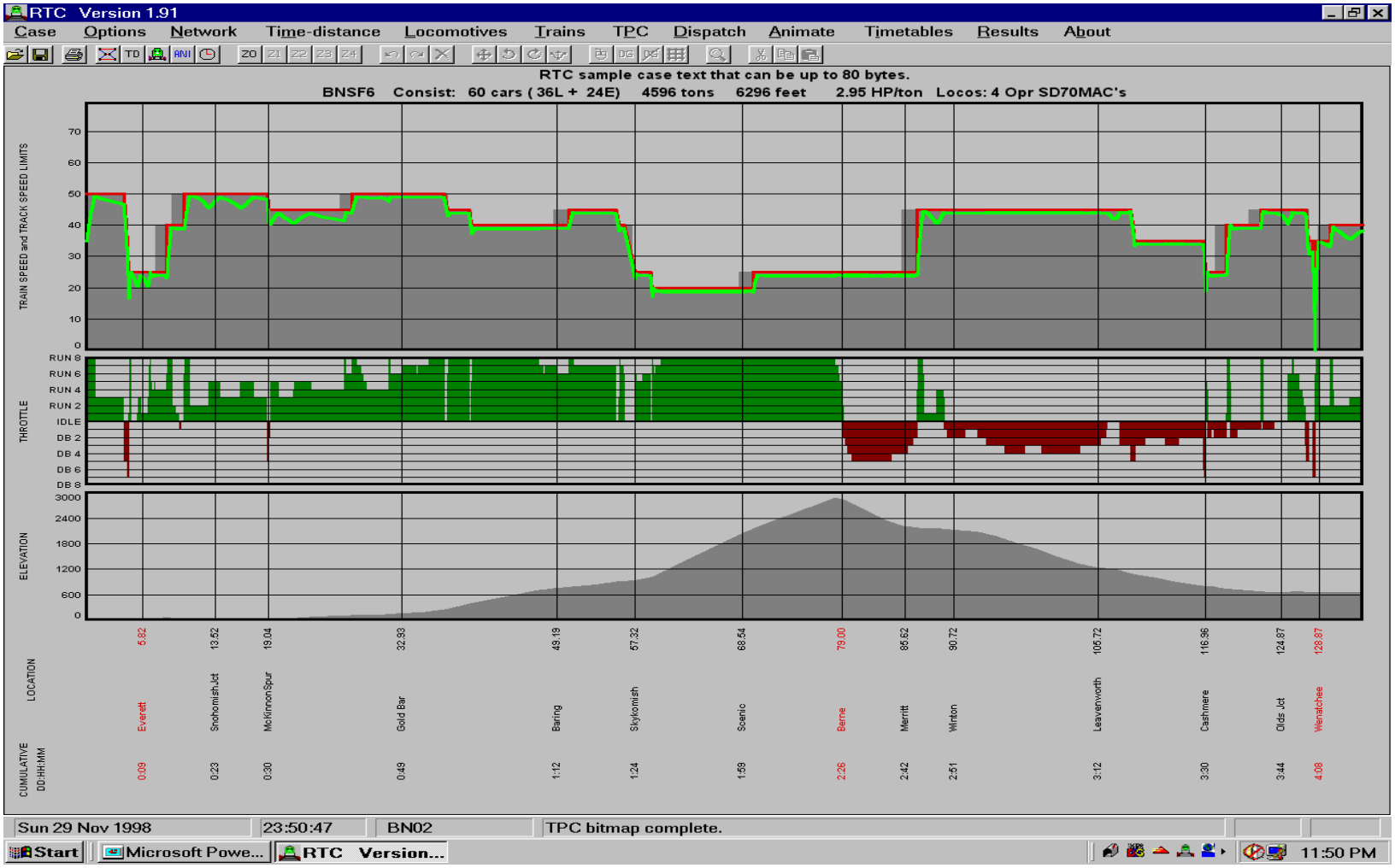
Sample RTC network of Chicago



Zooms show detail, such as the arrival and departure tracks at Newcastle



Network accuracy is important because the TPC depends on it.



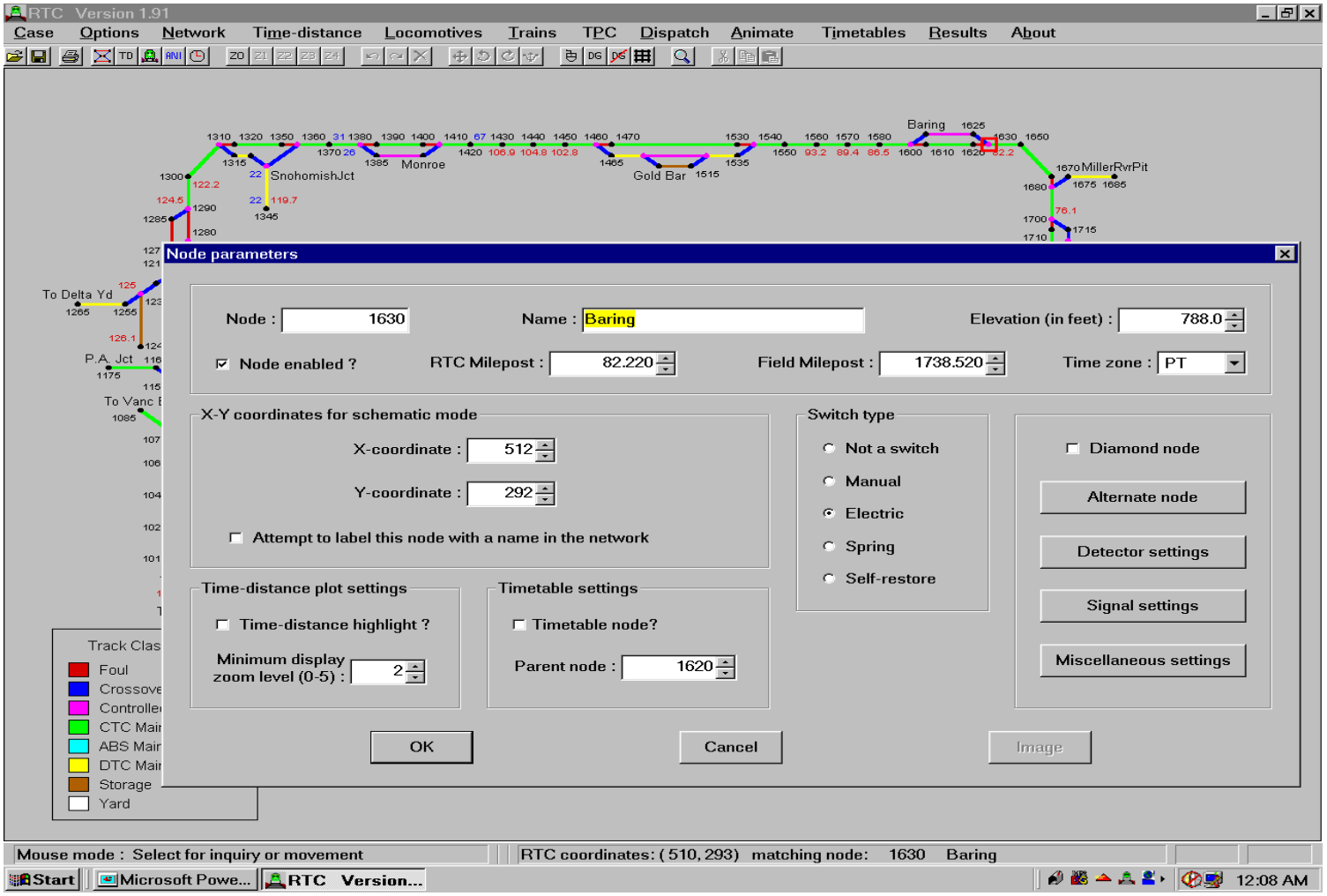
The data required to create an accurate network is generally available

- Location of switches
- Location of signals
- Failed Equipment Detectors (FEDs)
- Speed change points
- Significant grade change locations
- Significant curve locations

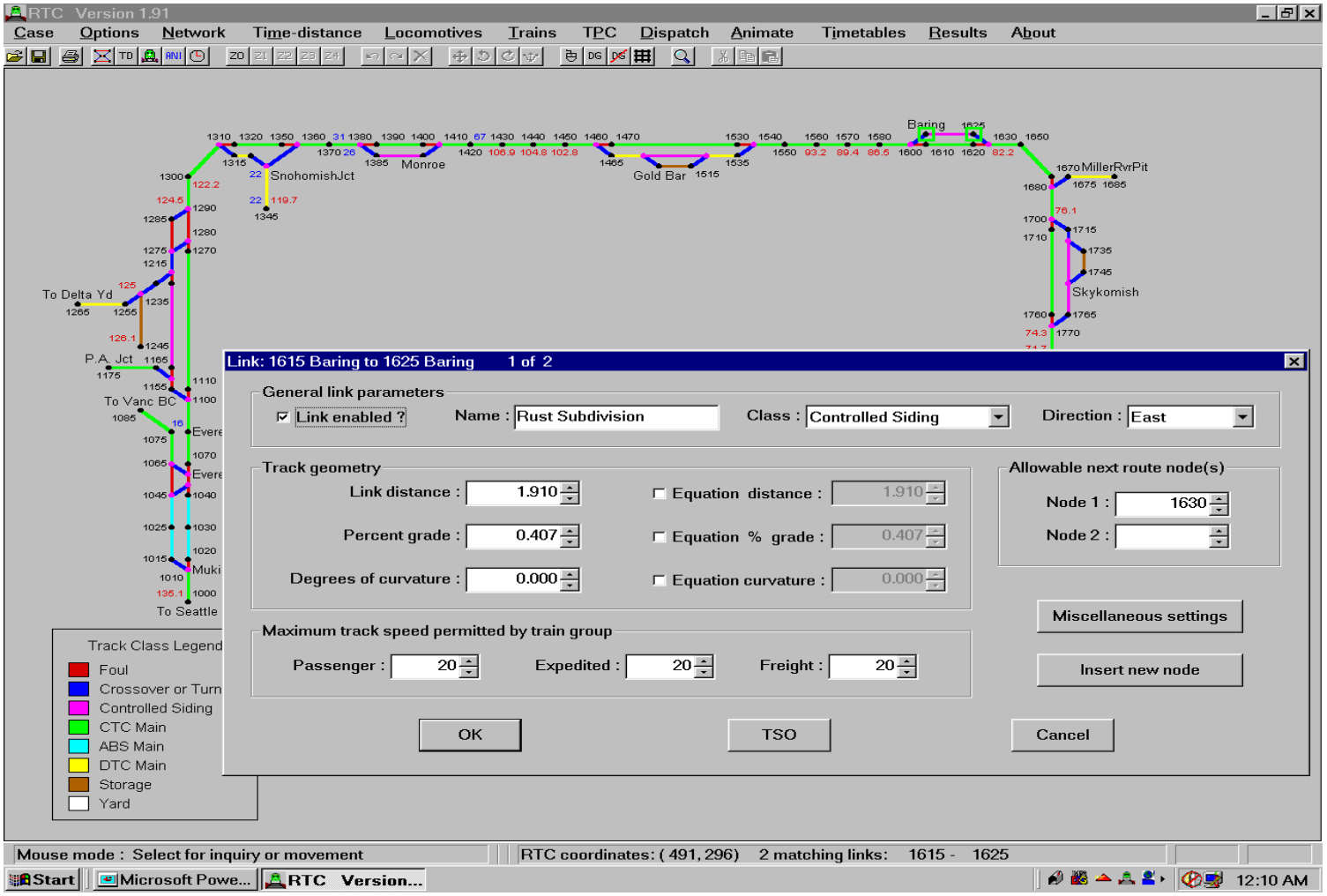
Excessive network detail is unnecessary

- For example, yard classification tracks do not significantly play a part in line capacity and therefore should not be included in networks
- The extent of yard tracks should reflect the ability of a yard to originate and terminate trains at any given time
- Obscure storage tracks should also be omitted

User friendly interface permits quick updates to location (node) information



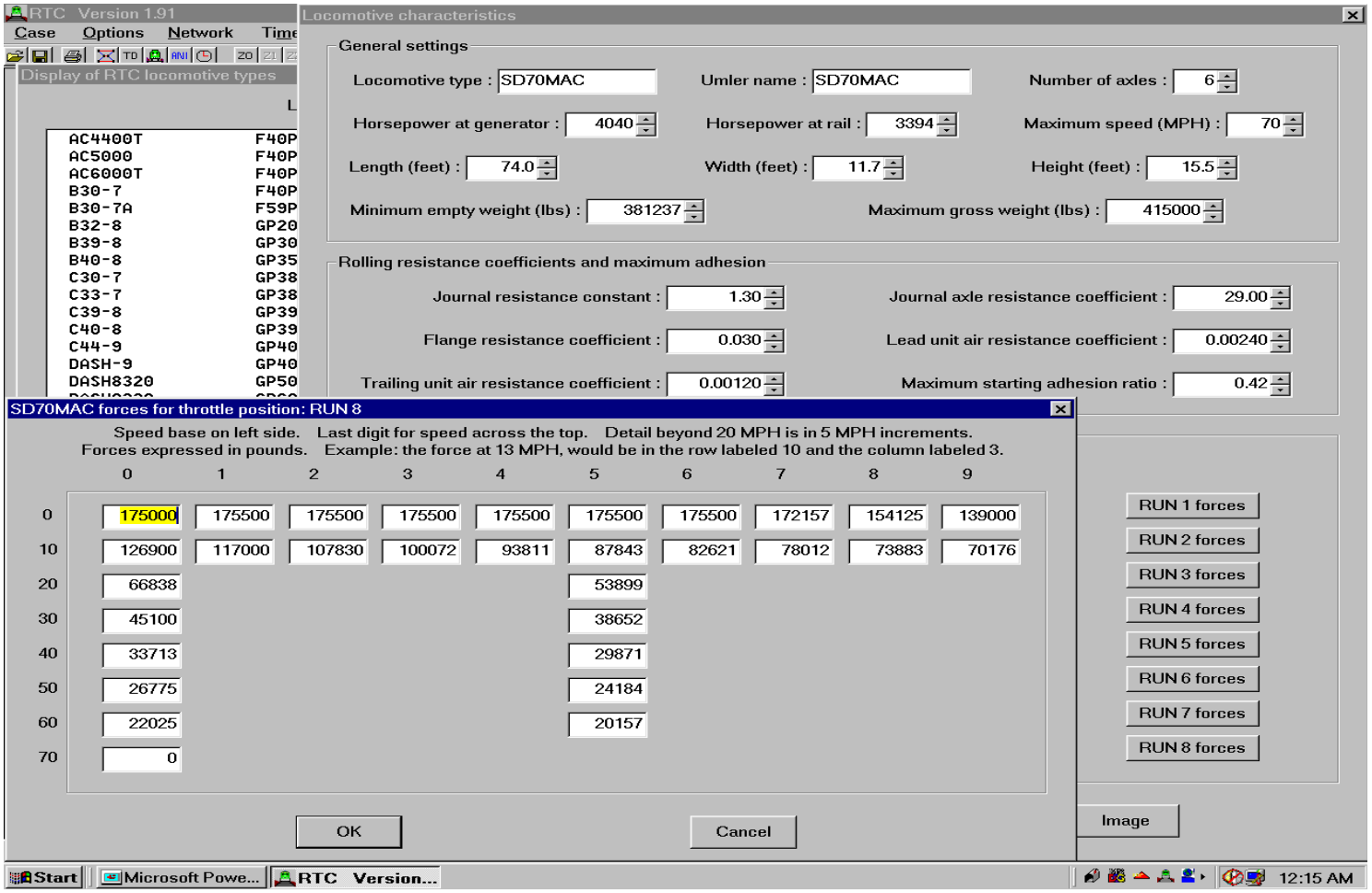
Track (network link) information interface is detailed but easy to use



The data required to create accurate train performance is generally available

- Accurate locomotive performance statistics
  - ✓ Tractive effort curves
  - ✓ Dynamic brake curves
  - ✓ Fuel consumption by throttle position
  - ✓ Tonnage, length, etc…
- Accurate train consist
  - ✓ Length
  - ✓ Tonnage
  - ✓ Car types and counts

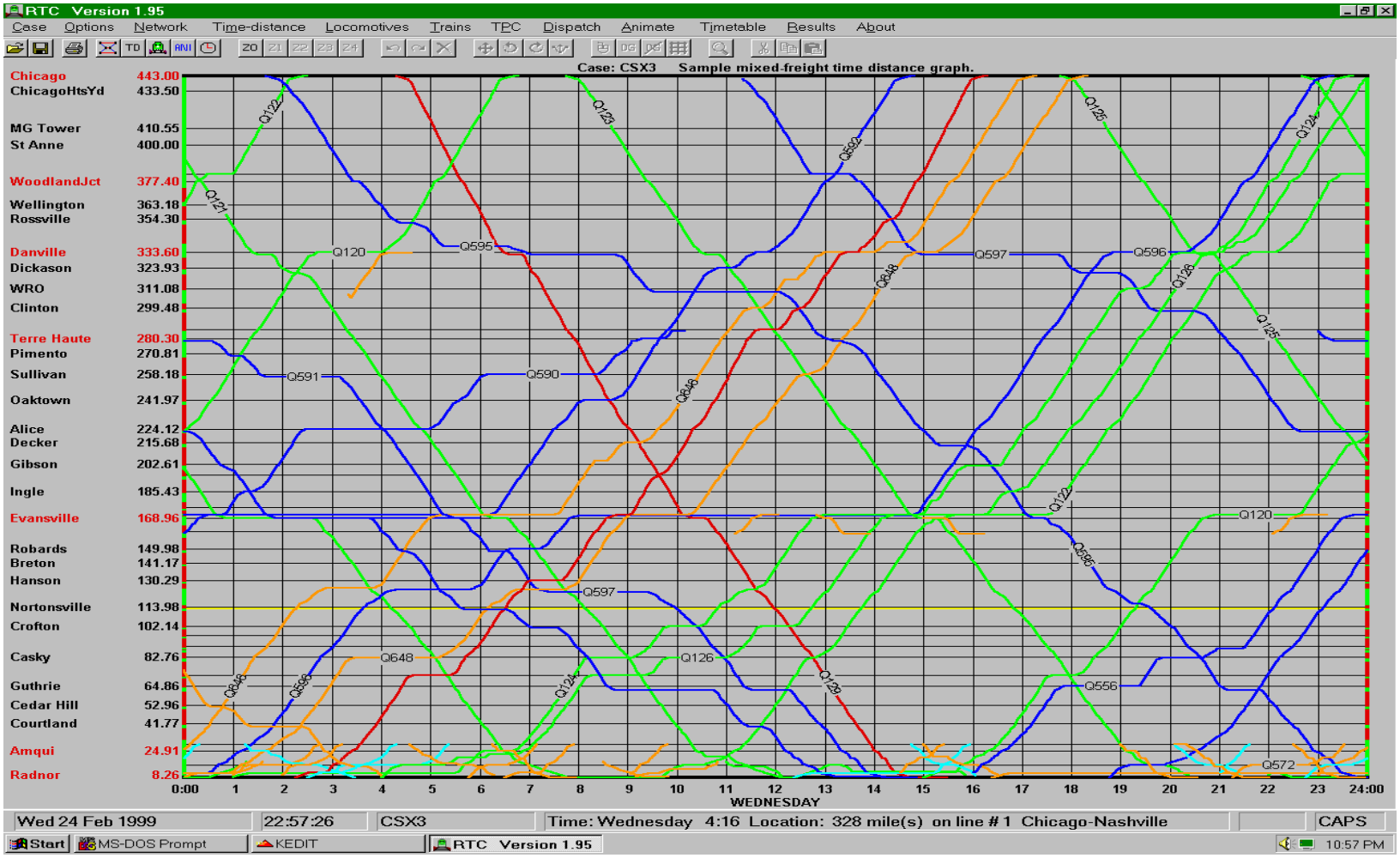
Comprehensive interfaces for updating locomotive specifications



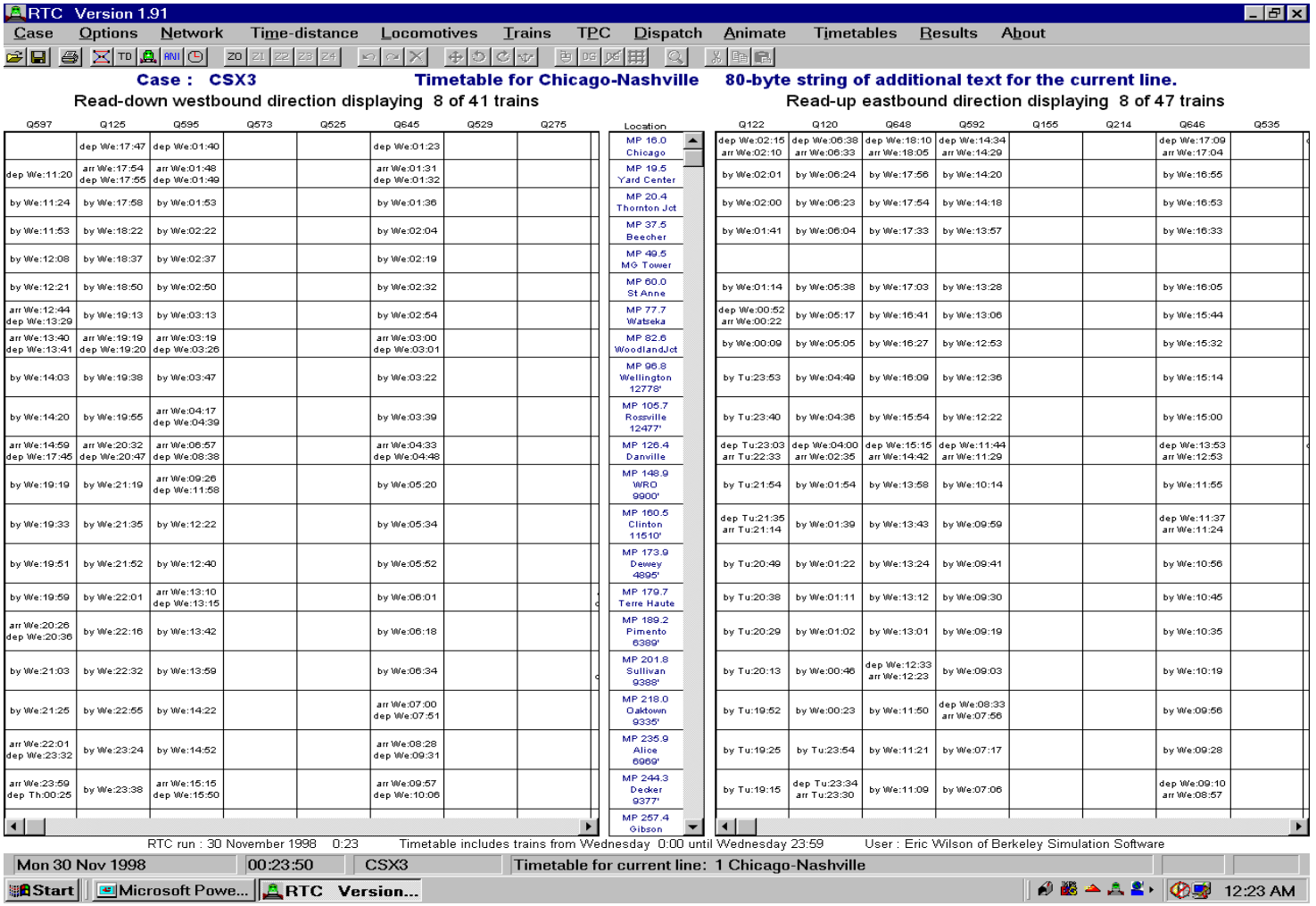
RTC output

- Time-distance diagrams
- Train performance graphs
- Timetables in the form of train sheets
- Video animation of past, current and future train movements throughout network
- Detailed train routing and schedule reports

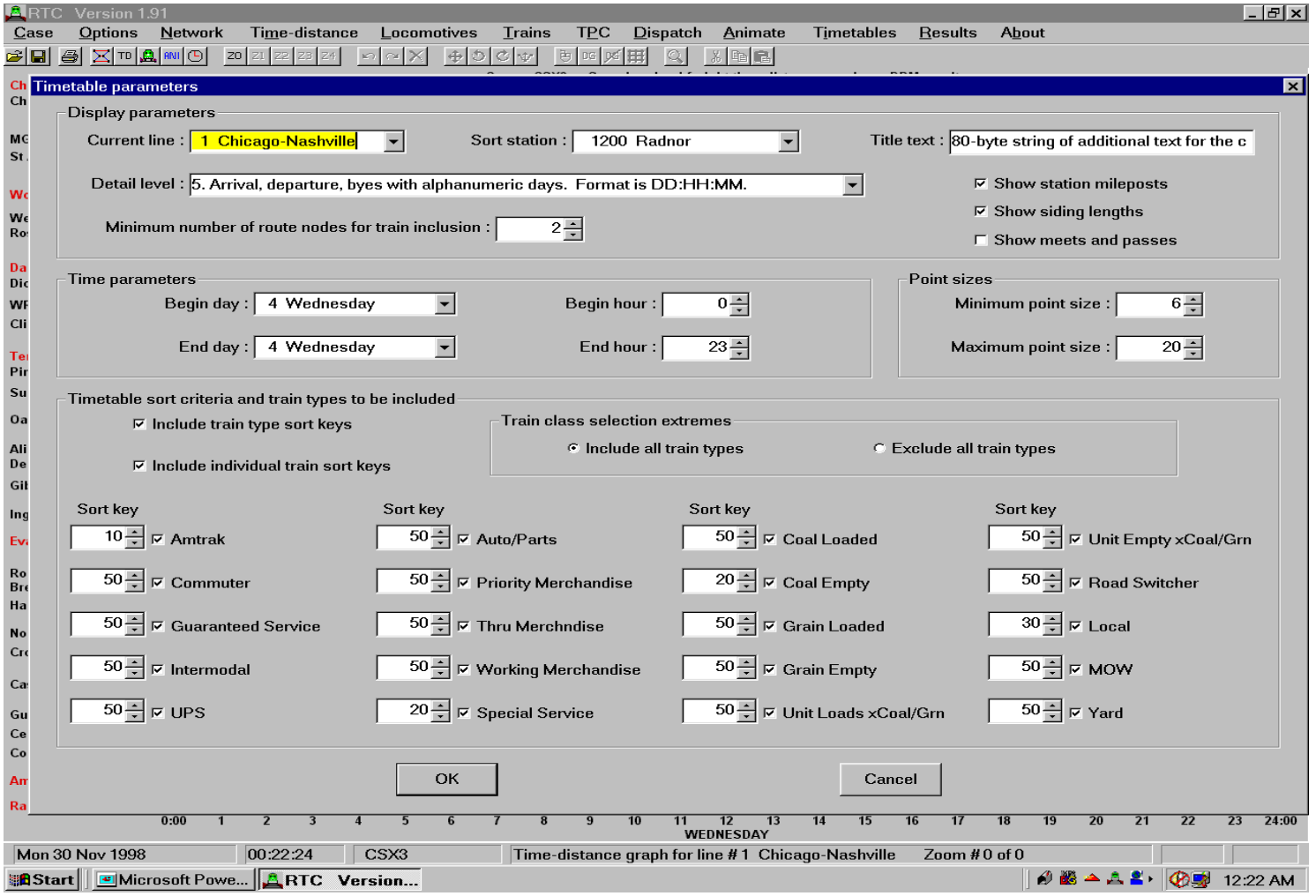
RTC's time-distance plots contain automatic train labels for clarity



Scrollable timetables are automatically produced



Timetable interface allows customized schedules to be created



RTC can bring significant cost savings and improved service. It can...

- Minimize delays by optimizing schedules and routing
- Reduce number of crews expiring on hours-of-service
- Enable capital dollars to be spent most prudently
- Improve equipment utilization resulting from more predictable arrival and departure times

Rail Carrier RTC implementation

- Build relevant networks
- Customize RTC to accommodate railroad databases
- Develop railroad-specific cost functions
- Install RTC with service designers and integrators
- Install hardware capable of running large systems

Looking ahead, RTC can ...

- Provide a safe and feasible migration path from off-line analysis to on-line network operations
- Enable a consistent operating policy to be implemented throughout a network
- Assist in training of dispatchers
- Permit flexible dispatcher districts