ENERGY EFFICIENT SCHEDULES IN THE JSC "RUSSIAN RAILWAYS"

Экология
Энергосбережение
Энергоэффективность

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DEVELOPMENT OF AUTOMATIC LOCOMOTIVE OPERATION SYSTEM

1998

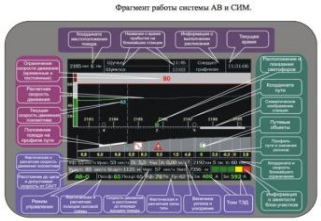
First generation of the automatic operation system (USAVP)

2002

Second generation of automatic operation system (USAVPP(G)). Had link to the recording unit of locomotive movement parameters and displayed information on screen.

2009

Third generation of automatic operation system was integrated with the KLUB-U and BLOK locomotive safety systems.



2013–2012

Admission of electric locomotives 2EC5K, 2EC6, 2EC10 and EP20 into the MPSUiD with functions for automatic train operation, energy supply monitoring, safety control, monitoring performance of locomotive units and engine operator information system of train traffic schedules.

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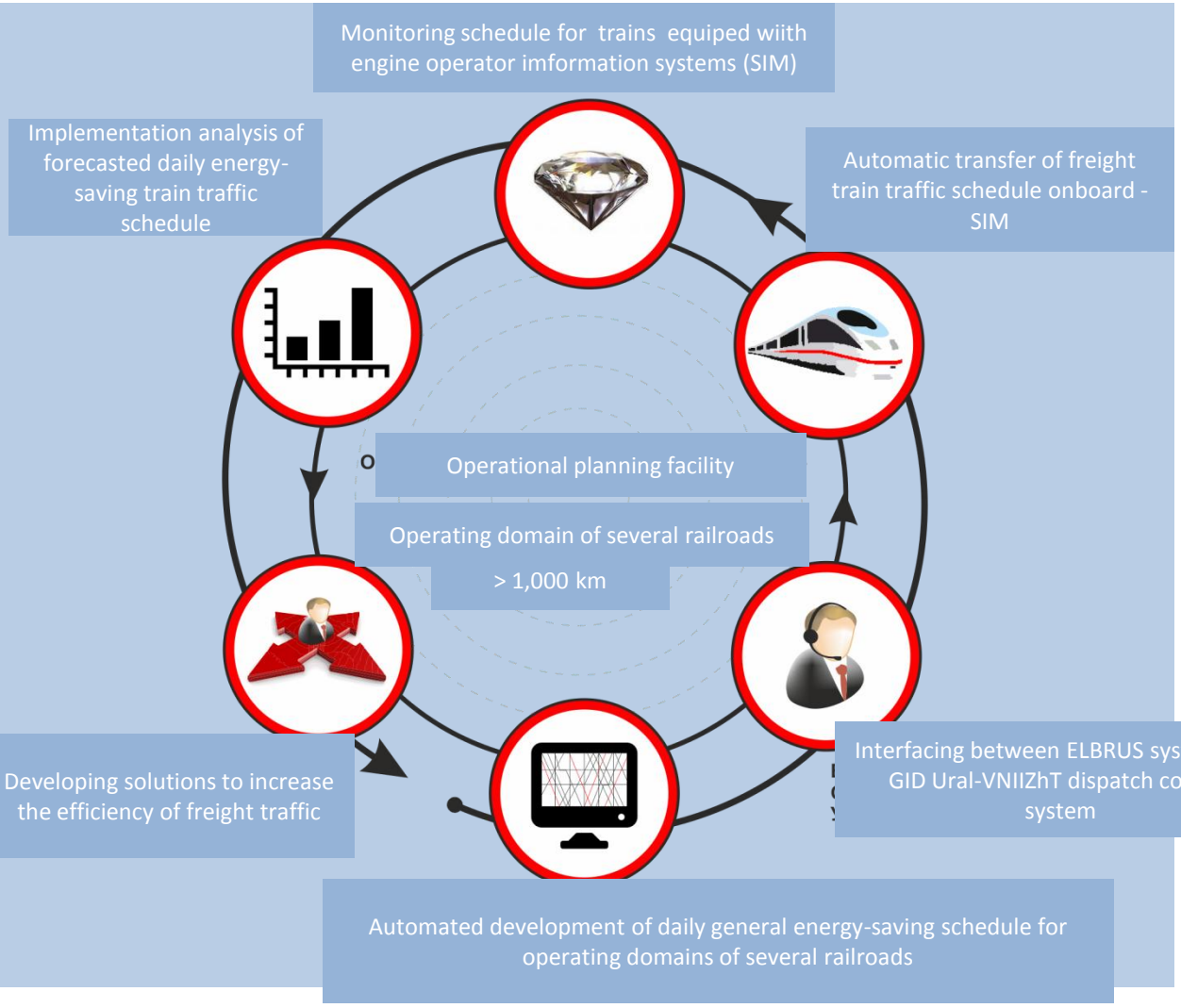
ORGANIZING RAIL TRAFFIC ACCORDING TO ENERGY-SAVING ROUTE SCHEDULES

Under current conditions of heavy transport, it is impossible to effectively organize the transport process without automation. Information systems created by the All-Russian Scientific Research Institute of Railway Transport allow for more effective implementation of Russian Railways' rail traffic organization strategy according to a schedule with firm time slots in extended operating domain networks, resolve the most difficult issues with shift-day planning, thereby reducing operating costs on the primary heavy-traffic routes.



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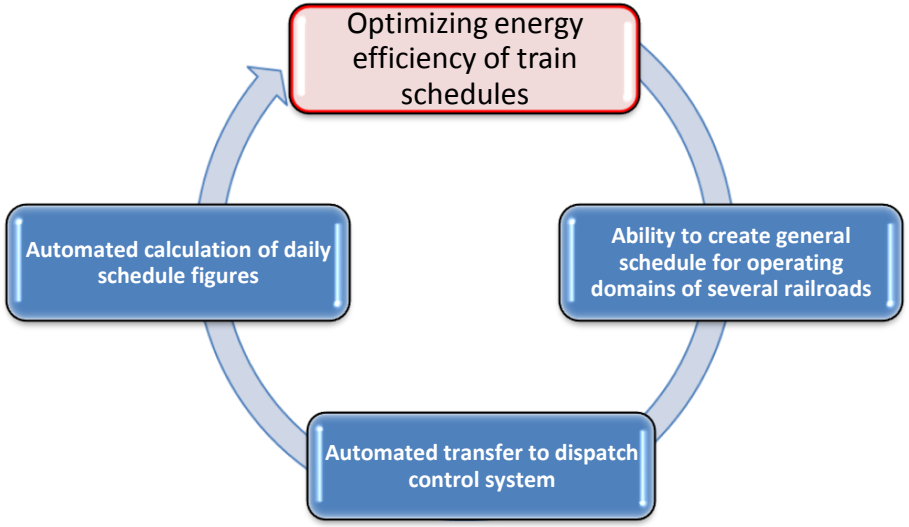
AUTOMATED SYSTEM OF FORECASTED DAILY ENERGY-SAVING RAIL TRAFFIC SCHEDULES – ELBRUS SYSTEM

Tasks performed by ELBRUS system

- Creates a forecasted daily energy-saving schedule for rail traffic
- Connecting varying schedules between operating domains of adjacent railroads. Forming a general schedule for train traffic
- Automated transfer of forecasted daily energy-saving schedules to a dispatch control system
- Automated calculation of varying schedule parameters



Parameters accounted for when composing varying schedules

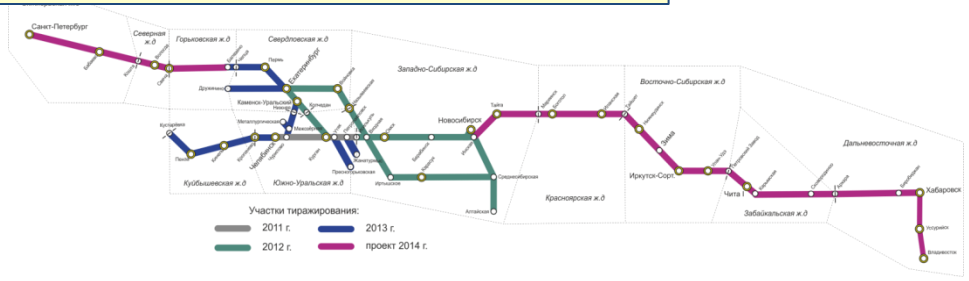
- Length of the train
- Intervals between trains
- Priority passage of separate categories of trains
- Number of receiving and departure tracks at the station and their specializations
- "Windows" and "windows" systems
- Speed limits
- Regaining speed
- Number of main tracks in routes

EFFECTIVENESS

Savings in operational expenses, including:	Up to 5%
Increase in service speed of transit cargo train traffic	2–4%
Reducing expenses on electric power to haul trains	2–5%

ELBRUS implementation plan 2011–2015

2011–2012 – South Urals, West Siberian railways
2013 – Sverdlovsk, Kuybyshevskaya, West Siberian and South Urals railways
2014–2015 – Gorkovskaya, Northern, Oktyabrskaya, Krasnoyarsk, East Siberian, Trans-Baikal, Far Eastern railways



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PROCESS FOR CREATING FORECASTED ENERGY-SAVING RAIL TRAFFIC SCHEDULES WITH THE ELBRUS SYSTEM

Ural-VNIIZhT train schedule

Planned "windows" for upcoming days

Tight run profile (target schedule)

RR's Main Computer Center

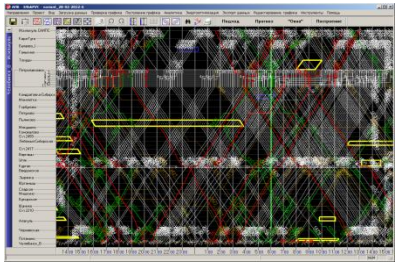
Schedule of passenger trains

Schedule of commuter trains

ELBRUS

ELBRUS

Automated schedule creation



Energy optimization

Coordination and approval of schedule

Ural-VNIIZhT train schedule

POLYGON ACS

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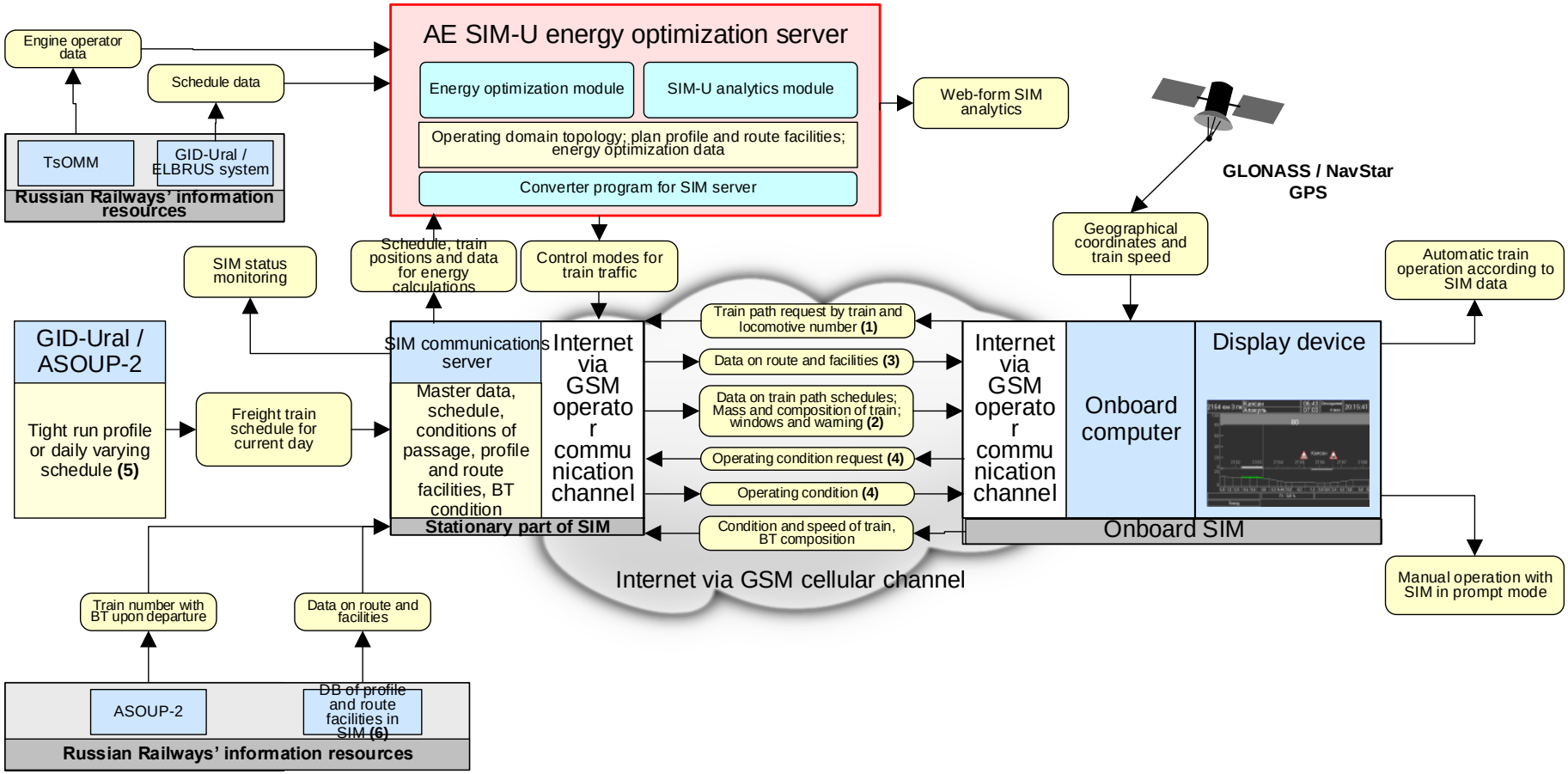
DIAGRAM OF TRANSFERRING ENERGY-SAVING SCHEDULES ONBOARD LOCOMOTIVES: "SIM" ENGINE OPERATOR INFORMATION SYSTEM



ONBOARD DISPLAY ON LOCOMOTIVE CONSOLE OF OPTIMAL ENERGY TARGET AND ITS IMPLEMENTATION DURING TRAIN TRAVEL