

Field service route optimization: common routing approaches

Different Types of Field Service Routes

✓ = % distribution of efforts

Route Type / Industry	Description	Attributes / Needs				
		Time Critical Response	Break-Fix Dispatch	Preventative / Recurring	Certification / Testing	Regular / Delivery Routes
Vending	Servicing, replenishment of shelves		✓	✓		✓✓✓
Pest Control	Inspection, treatment, ongoing pest mgt.		✓	✓✓	✓	✓
Route Laundry	Servicing & coin collection		✓	✓✓✓		✓
Utilities	Meter reading, inspections, outage response	✓✓	✓✓✓	✓✓		✓?
Fire & Life Safety	Maintenance of fire protection and life safety		✓✓	✓✓	✓✓✓	
Medical Equip.	Maintenance of medical devices, equipment	✓	✓✓	✓✓	✓✓	
Medical Equip.	Maintenance of medical devices, equipment	✓	✓✓	✓✓	✓✓	
Teleco.	Network installation, service calls and PM	✓	✓✓✓	✓✓	✓✓	
HVAC Service	Repair of heating, ventilation & cooling	✓	✓✓✓	✓✓✓	✓	
Elevator Mainten.	Elevator maintenance	✓	✓✓✓	✓✓✓✓	✓✓	

Common types of route optimization algorithms

- **“Nearest Neighbor”** sends technicians to the closest customer next fast but not always efficient. Genetic algorithms test thousands of possible routes and keep the best ones.
- **“Ant Colony Optimization”** finds paths by avoiding dead ends.
- **“Simulated Annealing”** gradually improves routes by making small adjustments.

Any route operator can implement a proprietary system optimization framework given advances in GenAI

OBJECTIVES

What is the business trying to optimize?

The desired business outcomes that guide the AI toward the best operational decisions. E.g.:

- Productivity Increase
- Cost Reduction
- Customer experience improvement
- Compliance requirement

INPUTS

What info is available to feed system?

Operational data and facts describing the resources, assets and work to be performed, likely pulled from ERP / operational systems, e.g.:

- # of Assets & locations
- # & grading of technicians
- Distribution of work orders /time
- # of customers by category

Real time data re. current work environment from external sources, e.g., Traffic, Weather

HARD CONSTRAINTS

Which rules cannot be violated?

Mandatory business, regulatory and operational requirements that every recommended solution must satisfy e.g.:

- Regulations re. # of inspections
- Required expertise of tech/ job type
- Contract minimums to be served
- Maximum overtime hours

SOFT CONSTRAINTS

Which resources/practices have flexibility to change?

Business practices / preferences that can be altered or resources that can be increased to optimize for objectives, e.g.:

- Customer priority between categories
- Technician workload & overtime
- Continuity of tech / location
- Route density