

OPTIMIZING YOUR NETWORK

Optimizing the configuration of your supply chain can deliver cost savings, efficiency improvements, and higher levels of customer service while minimizing transportation and handling costs. Here's how to optimize your network for greater flexibility in the future.

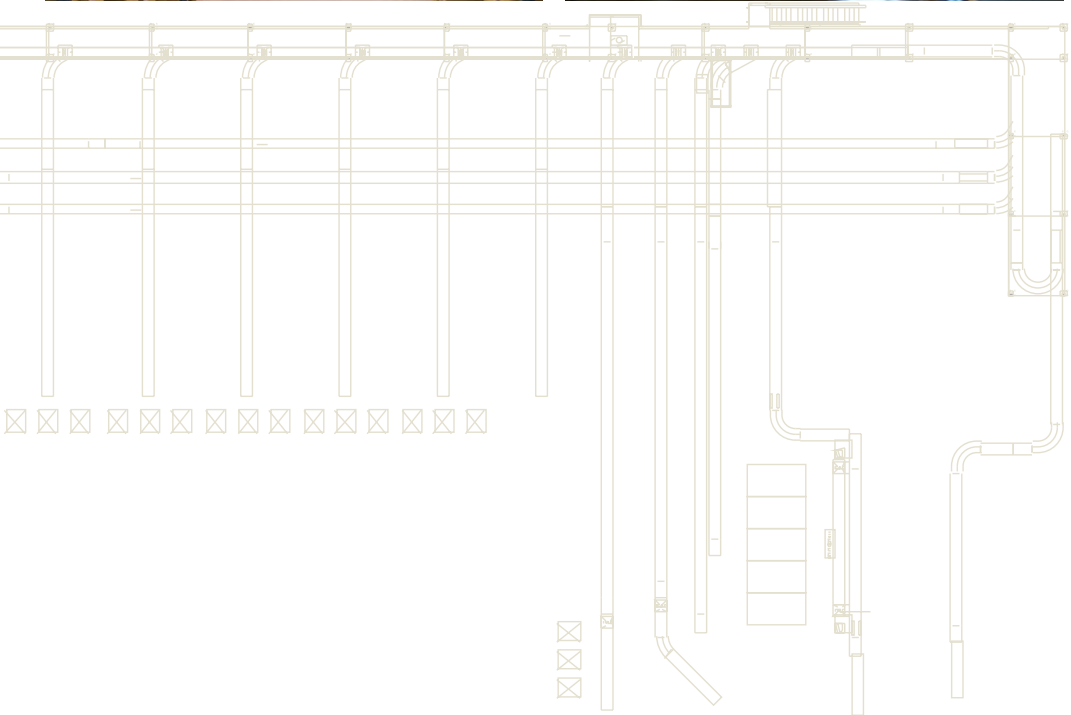
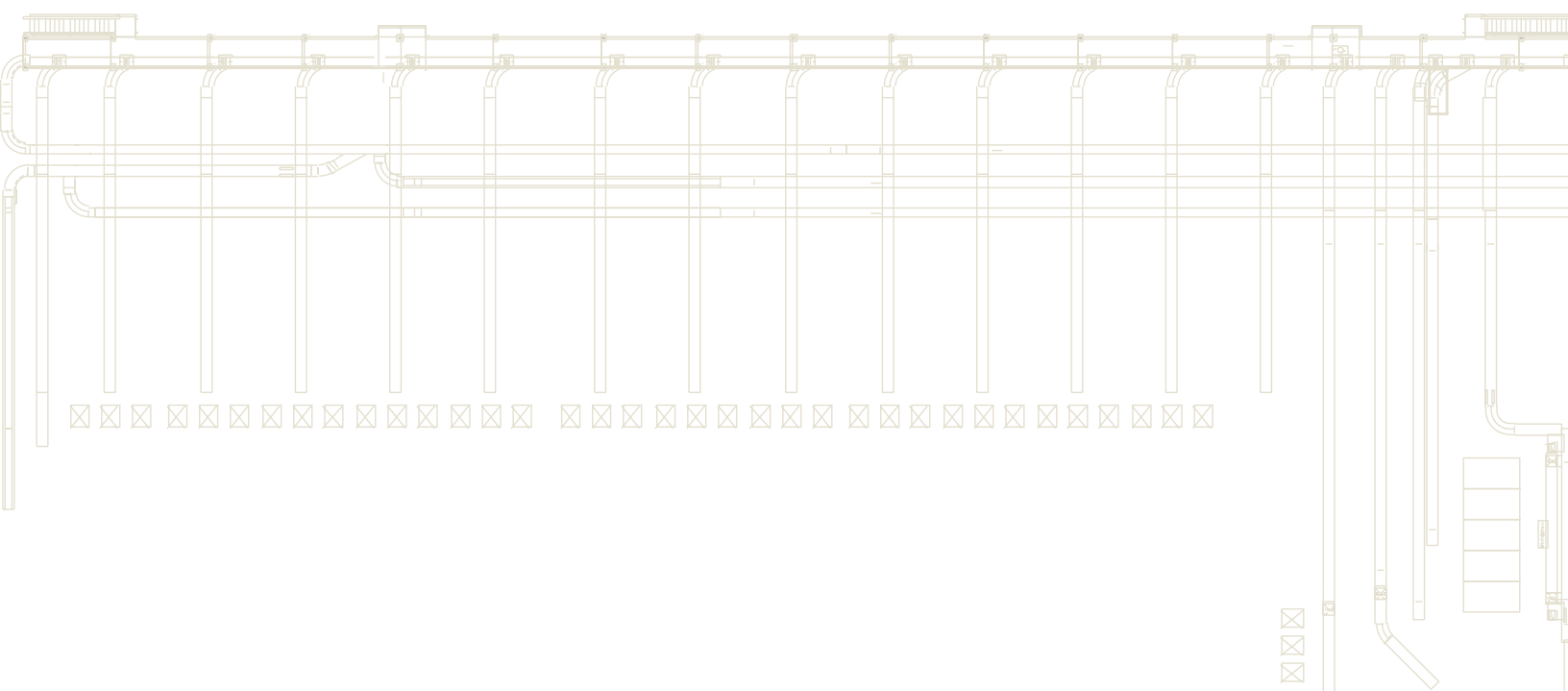


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A successful supply chain network analysis will yield the optimal balance of required service levels for each customer with the most affordable operational and logistics costs.

NETWORK OPTIMIZATION: AN INTRODUCTION

To succeed in the modern global economy, it is critical to build a supply chain that is information-rich, highly flexible, cost-conscious, and defined by both customer needs and internal corporate strategy. You must constantly reinvent your supply chain to allow for growth and change. How? Through the process of network optimization.

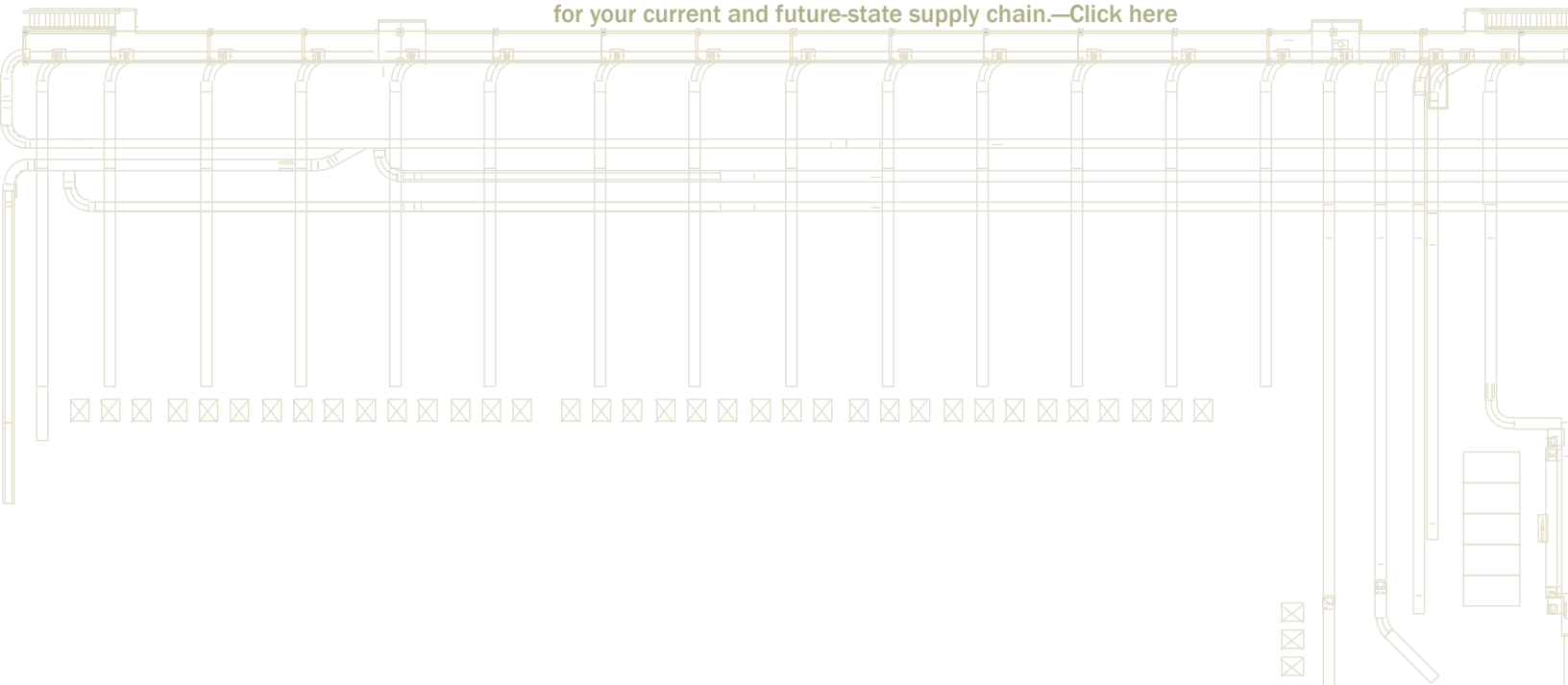
Network optimization is the comprehensive analysis of current operating data, combined with a review of external factors, which yields the most practical, strategic solution for a supply chain. The network optimization process supports the goals and expectations of your organization, your customers, and your suppliers while maintaining an inherent flexibility to adapt to inevitable changes.

Ultimately, when companies undertake optimizing their supply chain network, the process results in a series of compromises. These decisions will yield the ideal inventory profile, distribution center roles, sizes, and locations—based on set corporate priorities. Key to this determination is an analysis of overall inventory deployment—the number, size, location of various product categories (i.e. brands, stock keeping units, families)—inbound inventory profiles, and customer demand for those products.

It reveals a “more optimal” supply chain or logistics network that delivers an optimal balance of required service levels for each customer with the most affordable operational and logistics costs. The process includes identifying alternative sourcing plans that most effectively respond to changes in demand.

What network optimization is not: A one-time event to complete and never revisit. Rather, network optimization should be an ongoing process of planning for and adapting to change, grounded in the reality of the present. Think of the process as a roadmap that will help guide supply chain decisions as your company navigates the detours of an evolving market tomorrow, six months from now, and years down the road.

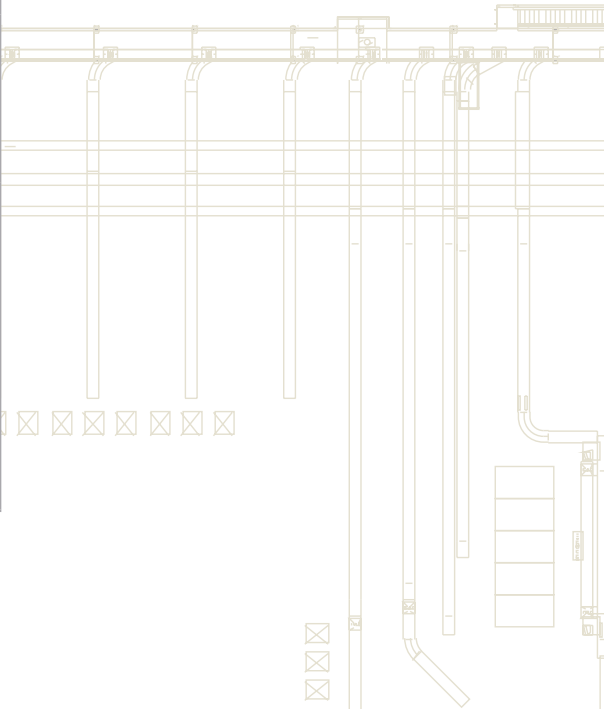
Learn how FORTE network optimization practice pinpoints the best network layout for your current and future-state supply chain.—[Click here](#)



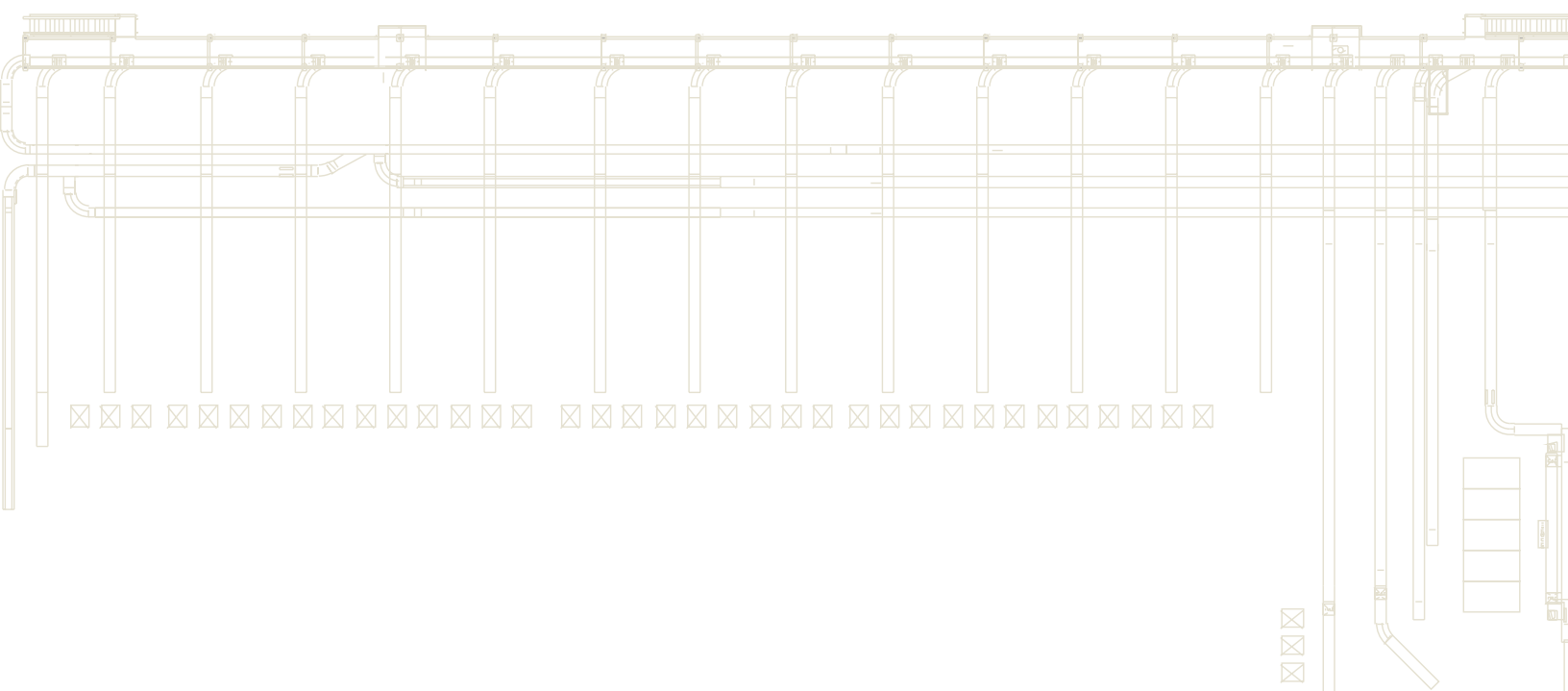
SHOULD YOUR NETWORK BE OPTIMIZED? EIGHT SIGNS THAT POINT TO YES

It's true. A network optimization process can be time consuming and involved. And yes, it can result in fundamental changes to your supply chain. So is it worth undertaking the effort? If you can identify with some (or all) of the following factors affecting your business today, then yes, network optimization is for you.

Rising distribution costs	Energy costs are on the rise, be they fuel cost spikes affecting transportation costs, or the electricity required to operate, heat, and cool DCs. Labor is costly, with overtime and additional shifts adding expense. Shipping costs also continue to escalate, with more expensive expedited deliveries growing in demand. Finally, with the rise of e-commerce, more companies are struggling with a dramatic spike in reverse logistics and subsequent re-shipping, all detractors from the bottom line.
Outsourced manufacturing and distribution	While moving manufacturing overseas may cut costs, it also adds miles to a supply chain, requiring additional lead time and inventory expansion to accommodate lulls and delays at customs. For some companies, it could also mean adding coastal DCs to the domestic supply chain infrastructure in order to more quickly bring inventory under control. Meanwhile, many companies' existing distribution networks weren't designed to integrate with foreign-based manufacturing operations, and can't efficiently handle the crunch. Third-party logistics providers (3PLs) may play a role in the network as well, but may not be leveraged appropriately.
Service as a key selling point	Faster, better, cheaper deliveries—this is a market leader's mantra. To stand out from their competition, companies feel compelled to offer stellar service at rock-bottom pricing, but can't necessarily deliver with their current supply chain setup.
Leveraging current technology	Many companies recognize that their original or current handling practices were designed for manual, less automated processes, and could benefit from an upgrade. Nonetheless, they may be reluctant to invest capital in the latest technologies and equipment without hard data to justify long-term use. Nobody wants to install an expensive warehouse management system (WMS) or automation system in a DC that's later determined to be redundant and subsequently closed.



Mergers and acquisitions	Has your company bought out a competitor, merged with a complimentary business? Are there plans to do so? While mergers and acquisitions are a quick way to gain market share, they're also messy—yielding more DCs that likely run on different technologies in the same general geographic regions, servicing the same customer base. This kind of growth also means more SKUs, more workers, more suppliers, and more customers to contend with than ever before.
Change in demand	Change happens. Whether it's growth in the form of new markets, clients, and products—or reductions due to closing markets, lost customers, and retired products—a change in customer demand equates to added pressure on the supply chain.
Struggles with ongoing costs	Are accumulating daily costs undermining your profits? Federal, state, or local taxes, chargebacks for late or non-compliant order fulfillment, and offsite inventory storage can all severely impact the bottom line.
Potential natural disasters and security regulations	A hurricane, tornado, earthquake, fire, or other natural (or unnatural) disaster could wipe out one of your DCs. If that happened, could your other DCs' inventories and personnel handle the need for reserve emergency stock? And are your warehouses and inventory in compliance with the increased number of government mandated environmental/security measures as applicable per region?



WHAT'S IN IT FOR YOU? THE BENEFITS OF AN OPTIMIZED NETWORK

The biggest incentive to undertake a network optimization process? Cost cutting while improving or maintaining customer service levels.

An optimized distribution network can yield anywhere from five to 10 percent overall supply chain cost savings. An optimized manufacturing and distribution network can achieve closer to 10 to 15 percent supply chain cost savings. Why the difference? A pure distribution network optimization only encompasses inbound and outbound freight, whereas a manufacturing and distribution network optimization also takes intra-facility transportation into account. Subsequent savings come from the identification and correction of redundancies and inefficiencies in warehouses and their contents.

Analyzing your network will highlight the costly facilities, practices, and procedures in your supply chain. Generally logistics managers already have a good sense of what the problem areas are and where improvement is needed, but they lack sufficient data to prove their case to senior executives. Often, the evaluation uncovers additional cost drivers that weren't even initially suspected, yielding greatly improved insight about a supply chain.

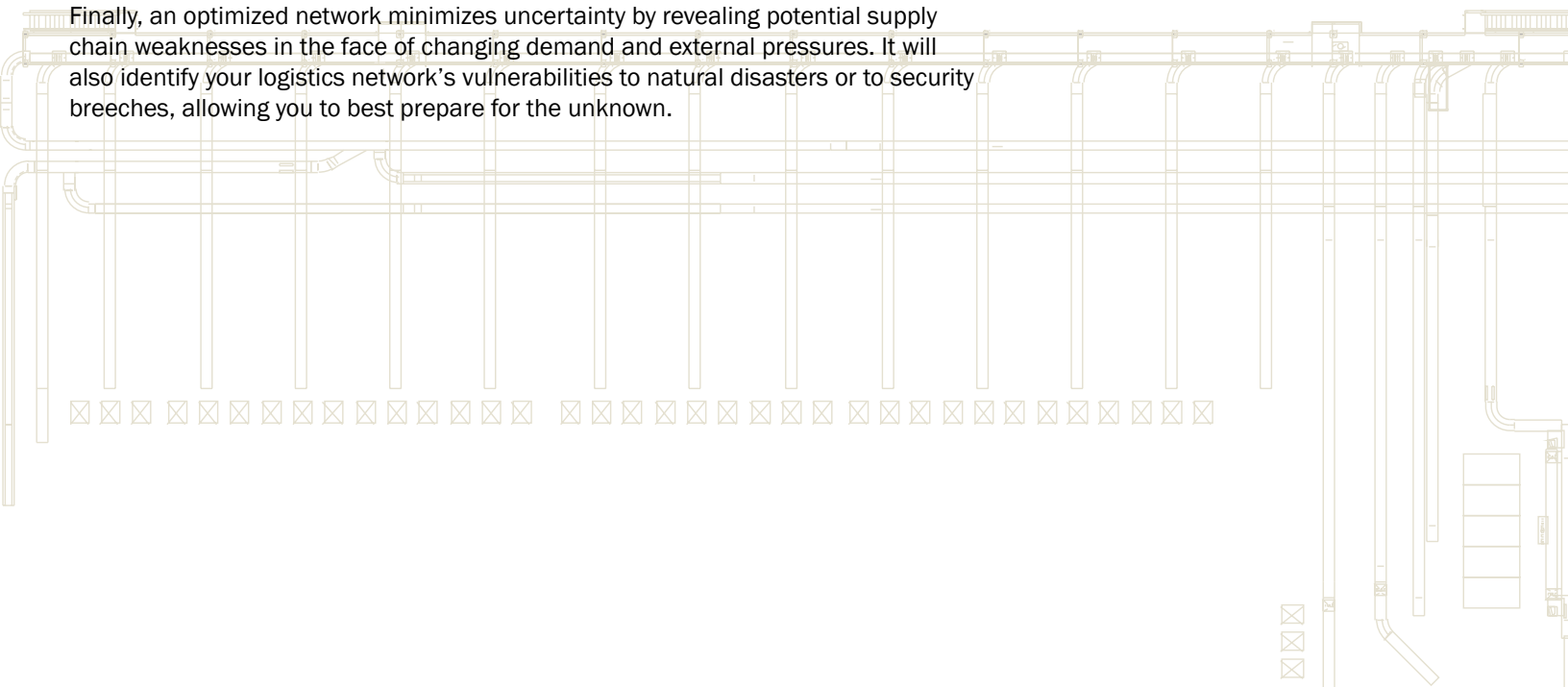
A network analysis provides concrete proof of needless costs—such as excessive less than truckload (LTL) shipments, out-of-control fuel costs, overstuffed warehouses, over-complicated logistical networks, clogged docks, or congested ports—and offers a variety of possible scenarios from which the ideal strategic solution can be selected.

The ideal solution will increase your productivity and throughput, while delivering better, more flexible service to your customers. While others may promise better, faster service for less, companies with optimized networks can support that claim without fear of falling short of customer expectations, or of senior management's expectations. An optimized supply chain also allows for maximum flexibility in adapting to changes in business strategy while supporting growth.

Finally, an optimized network minimizes uncertainty by revealing potential supply chain weaknesses in the face of changing demand and external pressures. It will also identify your logistics network's vulnerabilities to natural disasters or to security breaches, allowing you to best prepare for the unknown.



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HOW TO OPTIMIZE YOUR NETWORK: A FIVE-STEP PROCESS

So you're ready to reap the rewards of an optimized network. Here's how it's done, broken out into five phases:

- 1) Defining goals and objectives
- 2) Collecting relevant data
- 3) Establishing your base case
- 4) Analyzing and evaluating potential future-state scenarios
- 5) Selecting your optimal future-state operations model

Commit to completing each step of the process in its entirety, utilizing both powerful algorithmic software and expert modeling scenarios, in order to achieve the best solution.

One caveat before you dive in: Commit to completing each step of the process in its entirety, utilizing both powerful algorithmic software and expert modeling scenarios, in order to achieve the best solution. Otherwise, you waste time and effort as well as capital and operational expense. Barring any significant issues, a typical first-time network optimization process generally takes 10 to 12 weeks to complete. Ongoing network optimization project timeframes can be significantly cut down if the process is brought in-house and the base case is maintained. The timeframe depends on the complexity of the desired future-state situation and the availability and dedication of the project team.

Should We Use a Consultant?

Should a company undertake a network optimization process alone, or should the analysis be guided by an outside expert? Large, multi-plant, multi-DC companies that operate in volatile markets must make the process of network optimization a priority that's well-integrated into corporate culture. Because of this, such organizations tend to have dedicated, in-house staffers who possess advanced degrees in operations research and/or quantitative analysis. Since these internal experts are very experienced with these kinds of projects and are readily accessible, an outside consultant may not be needed.

While input from your own in-house professionals is invaluable, those consumed in the day-to-day operation of the supply chain elements frequently lack the time, objectivity and enough visibility into the big picture to conduct a thorough supply chain network analysis.

For companies with resources either not available or already overwhelmed with existing responsibilities, working with an experienced consultant tends to yield the best results. There is a substantial cost in purchasing the necessary software and in developing network optimization as a standardized, internal process. Universities and smaller firms that specialize in supply chain optimization projects (as opposed to larger, general-purpose international consulting firms) are good resources, particularly when approaching this project for the first time. These organizations can help you understand what the data requirements are, if the data is readily available, or help to retrieve the information from multiple databases. They then work directly with the company's internal team to help implement the project and develop a repeatable process that could eventually be brought in-house.



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Step Two: Collecting relevant data

Accounting: financials and fiscal year budgeting

Manufacturing: production schedules, delivery requirements, impact of modifications

Customers, suppliers and carriers: service requirements and data validation; also information on their own long-term business strategies, and how these may affect your business

Now that the team has been assembled, it's time to define corporate goals for both the short term and the long term. Because your optimized network must ultimately support your entire organization's supply chain needs, it's critical to the process to establish a clear understanding of each business area's past and present practices, as well as future plans. In order to model a network that's flexible for the future, knowledge of projected strategies and objectives is a must.

As examples, goals could range from realigning supply chains with redundant facilities or multiple supply chains arising from a merger or acquisition, reducing the number of LTL shipments, better handling of seasonal spikes in demand, or delivering product one to two full days faster than current operations can manage.

Step Two: Collecting relevant data

Once the goals of the network optimization process have been defined, it should be fairly clear what types of data need to be collected for analysis. Typically the necessary information falls into three broad categories:

Order and shipment data per DC: Start with a review of the total cost of inbound and outbound freight for the past three to four years, paying close attention to patterns or cost spikes caused by seasonality, increased sales, new SKUs, or expansion into a new region for example. Compile total costs based on different shipping components, such as ship-to locations by zip code, replenishment sources, intra-company transfer freight, product lines and number per lane, SKU frequency and volume (daily, weekly, monthly, quarterly, annually), transportation modes, and tariffs or carrier discounts.

Inventory levels per DC: Determine current inventory operating levels, as well as the maximum level at which each DC can operate accurately and cost-effectively. Consider the average number of SKUs stored, throughput, the range of products at each location, and the seasonality of inventory.

Current operating expenses per DC: Data to collect here includes labor, heating, cooling, electricity, and maintenance costs, in addition to the average cost per unit for inventory storage and handling.

The following information is important for thorough analysis:

Projected sales growth: It is important to gather as much information as possible about projected future sales growth of each product line family, calculated out three to five years in the future. Anything further than five years is too indefinite to be relevant.

Current and future customer service requirements: Customers are important resources for key information because you want to design a supply chain that supports your customers' needs and strategies as well as your own.

It is important to collect as much data as possible on existing service level agreements (SLAs) and critical-to-quality (CTQ) service requirements. Voice of the customer initiatives are important to identify what they value in your current supply chain and what they desire in the future version. Also review customer-specific order histories, delivery time specifications, transportation modes, and cost of freight.

Taxes and incentives: At the state and local level in particular can be key determining factors in the ultimate selection of an optimal DC location. Review each DC's current tax obligation and determine the costs. Some states and communities offer more attractive tax incentives than others. High-margin businesses may discover that a high state tax burden exceeds their annual logistics costs. Further, all but four states impose a corporate income tax, with rates ranging from around 12% (Iowa) to approximately 3% (Indiana). So you'll need to collect data on the tax situations for potential locations as well as current. (More on taxes in Step Four.)

Costs of DC closures: The figures associated with the transition and clean-up costs resulting from a DC closure are another piece of information to factor in the calculations. These include unemployment or severance packages for laid-off workers, removal and relocation or sale of capital equipment, and a review of when facility leases or 3PL contracts are scheduled for renewal or termination.

A few caveats to remember about the data itself as it is collected:

- It is important to be sure that each DC defines a SKU in the same manner. For the purposes of network optimization, it's important to register the same product stored in or shipped from different DCs as different SKUs. This is critical when comparing the throughput of each product from different locations.
- Aggregate the SKU data by grouping them into product families. While you may handle tens of thousands of discrete SKUs, it would be terribly unwieldy to attempt to do the calculations with that much detail. By grouping into the more manageable form of product families, 20 for example, it's much easier to handle. Remember, the goal of network optimization modeling is to yield a result that is ultimately more strategic than operational.
- Separate the data on a DC-by-DC basis rather than averaging all the DCs together. Analyzing each DC's costs and volume of inbound and outbound shipments separately yields greater insights.

Where to Find the Data

A few years ago, finding the data may have been a real nightmare, but now most companies are swimming in information. Enterprise resource planning (ERP) systems will provide forecasting data; transportation management systems (TMS) store carrier data; labor management systems (LMS) or payroll's time keeping system is the source for labor costs; warehouse management systems (WMS) yield order fulfillment data; and warehouse control systems (WCS) offer throughput rates for current material handling systems.

If all this information, or at least part of it, is stored in a filing cabinet on paper—rather than electronic format—someone will need to input this data. Having all the information electronically is critical to the process, no matter what data analysis software engine is used internally or by a third party.

If you find you're missing a critical element of the data, or you lack the necessary information to do a thorough analysis, your customers can be a valuable resource. They shouldn't mind sharing the information with you, as the ultimate goal of your network optimization process is to serve them more efficiently and cost-effectively. Suppliers can also be a good source for missing information such as order patterns and characteristics.

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As you work with the data, it's important to cleanse and organize the information to ensure accuracy.

Step Three: Establishing your base case

Now that all the data has been collected, it's time to use that information to create a model of your current supply chain's operations, called a base case. The base case will be used as a standard against which potential future-state operating scenarios will be compared.

As you work with the data, it's important to cleanse and organize the information to ensure accuracy. Although most data analysis software programs can help, having an expert statistical analyst involved is also key. It's important to not rely solely on technology to build the base case model.

Some human interaction will be necessary in order to audit the data for accuracy and to delete instances of random variance. For example, the one time you had to ship an order to Alaska should be filtered out, as it would shift your data away from the norm. Often, it is primarily freight costs—inbound, outbound, and intra-facility—that must be the most accurate in order to attain the most realistic portrait of current operations.

Assemble the members of your strategic decision-making team. They should each review the information pertinent to their portion of the business, as they are the most likely candidates to catch errors and highlight anomalies.

The goal is to establish a base case model that represents at least 95% of actual current supply chain reality. Then, confirm this reality with your internal team. Everyone has to agree that the base case is a solid representation of how your supply chain operates today before you can proceed to the next step of the network optimization process.

Step Four: Analyzing and evaluating potential future-state scenarios

Once the base case is established, it's time to compare your current reality to a variety of potential scenarios of future conditions and anticipated response. To do this it is important to first establish and prioritize which variables will present key factors in the analysis. These variables could be inbound or outbound freight costs, key customer accounts, required service levels, taxes and tariffs, insurance, inventory, labor availability and corresponding wage requirements, or the cost of running each DC. The internal strategic team will help to determine which of these elements takes priority in the support of future strategic goals.

Once the team has agreed on the prioritized variables, it's time to work the numbers within an assortment of scenarios. Typical examples of potential future scenarios to evaluate may include:

- Customer service is not a factor
- Customer delivery time cannot exceed three days
- Customer shipments become 50% smaller, shipped twice as often
- Maximum capacity of each DC is one million cases per year
- Direct shipments from manufacturing instead of DCs
- Increase in process reliability from 55% to 75%
- Generous tax incentives in one location versus another
- Outsourcing manufacturing overseas to dramatically cut costs

Generate a variety of scenarios by manipulating the data to model a wide range of alternative futures. Then, through the process termed scenario management, repeat each scenario while varying an array of different parameters and other factors such as changing DC locations and footprints, SKU locations and quantities, and delivery and service requirements. Compare each resulting iteration based on the amount of risk and cost involved in implementing each possibility.

Almost always, the question of where to best locate DCs and what SKUs to stock in each facility often comes down to two factors: freight costs and taxes. The usual objective is to locate each DC in an area that minimizes transportation costs to key, or the largest number of, customers while minimizing tax obligations. At a basic level, a network evaluation trades off variable costs (i.e. labor and shipping costs) and fixed costs (i.e. costs of operating a DC) to arrive at an overall minimal total cost solution.

For companies shipping orders between states, the destination rule applies, wherein income must be allocated to the destination state that receives the shipment. If the destination state does not mandate corporate income taxes, or if the company doesn't do enough business to meet minimum taxation levels there, then sometimes a throwback rule applies, with the income redirected to the state from where the shipment originated for tax purposes. Additionally, some states impose a unitary reporting requirement, meaning companies must combine all related business income and pay taxes on that income to the state of origin. All these factors must be considered when calculating the costs required to meet customer service demands.

Ultimately, the ideal optimized network model is the one that generates the maximum amount of flexibility and cost savings with the minimum effect on service. Sophisticated analysis software cannot do this alone. A creative quantitative analyst and/or experienced supply chain engineer is critical to the process of systematically identifying which models are practical in terms of the real-world logistics—variables a software system cannot incorporate. For example, analysis software does not take into account that coordinating outbound shipments from Florida is a pain for many logistics professionals.

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Step Five: Selecting your optimal future-state operations model

Now it's time to assess the various future-state scenarios you've developed by manipulating the data that established your base case. When comparing these options, remember that you're looking for the model that best supports your

organization's corporate strategic plans while achieving a sufficient balance of costs and customer service levels.

You want to produce practical solutions for your real-world supply chain that is based on more than purely technical data. Use standards—transportation costs, service levels, availability of workforce, operational cost, and ease of implementation—as your guide throughout the evaluation and selection process. Often there are several future-state scenarios that yield great savings on paper, but may not be realistically attainable. Running cost of implementation comparisons typically helps narrow the field, as will bearing in mind tax burdens and customer CTQs. For example, an ideal network may propose relocating DCs to states that impose minimal taxes, but the workforce in those areas is inadequate to staff and operate the facilities. And uprooting multiple DCs at one time is simply not feasible.

Once the scenarios have been analyzed, reconvene the network optimization team to review the top two or three recommended network models. The group will work together to determine if changing the current network is a viable, cost justifiable effort. The answers are in the data. Insights gained from both proven and disproven assumptions will empower an organization to implement a redesign, or confirm that maintaining the status quo is the better choice.

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Although return on investment (ROI) figures are important factors to consider, other elements may prove compelling enough to make a change.

Although return on investment (ROI) figures are important factors to consider, other elements may prove compelling enough to make a change. For example, if the statistical analysis reveals vulnerabilities in the supply chain, and the optimal future-state model provides a practical approach to resolving those weaknesses, then that may be justification enough.

Real-World Examples

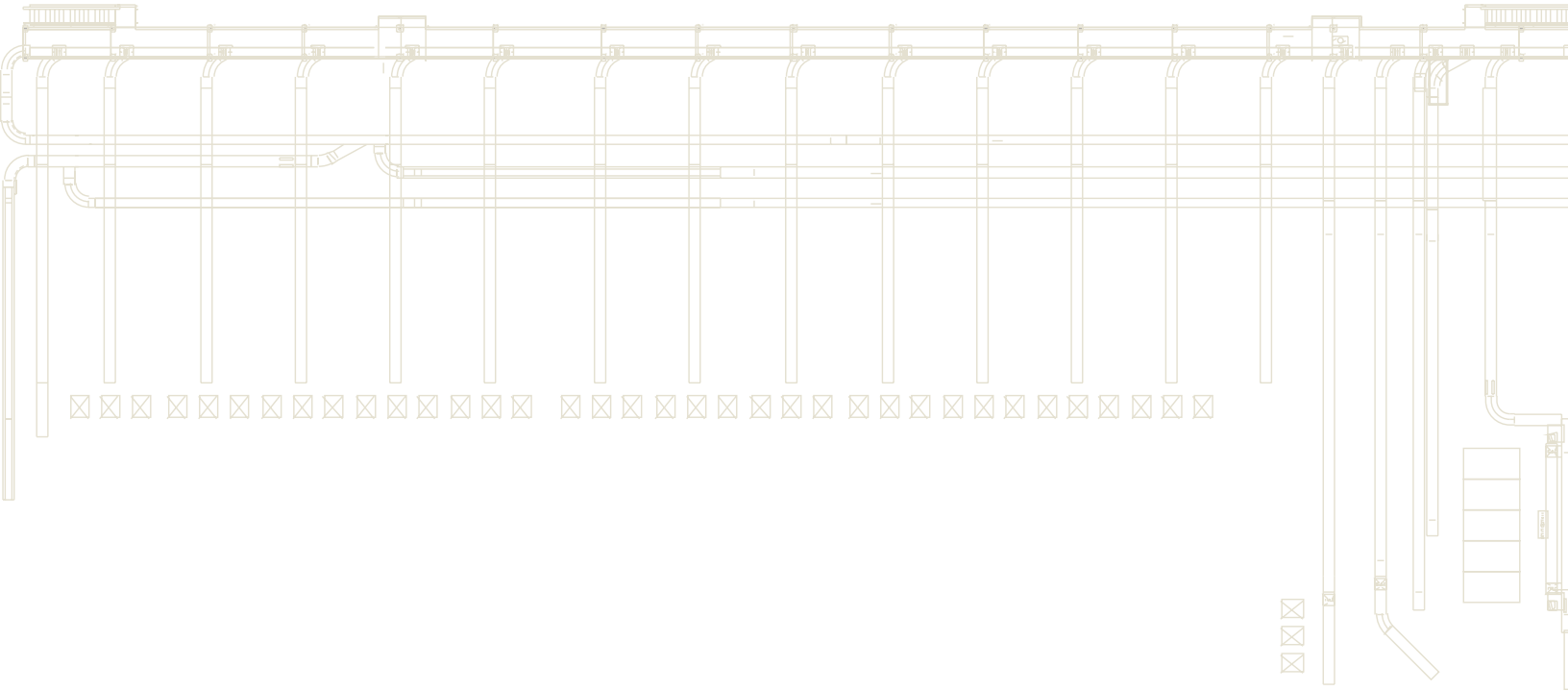
Tool for Competitive Advantage

A Midwest tool manufacturer had slipped to number three in their industry because competitors were saving money through outsourced manufacturing. When the lease on an east coast DC came up for renewal, the firm undertook a network optimization analysis to review their domestic distribution network and their product sourcing/manufacturing to uncover opportunities to increase their competitive advantage. A variety of different manufacturing and distribution scenarios were modeled. The models focused on LTL and international freight rates and on the estimated potential new DC costs versus those of existing locations. Ultimately, the company consolidated into five DCs and moved 50% of their manufacturing operations overseas. While the future-state scenario options provided cost savings up to \$30 million, the company determined that an option saving just \$6 million would ensure high product quality and high customer satisfaction while adequately decreasing operating costs. It also allowed for daily delivery of 80% of orders.

Sweet Customer Service

When an international candy manufacturer looked to expand their distribution network of three DCs in order to meet customer requirements for just-in-time delivery, they sought to be more cost effective by converting LTL shipments into bigger loads delivered on shorter routes. While evaluating potential new locations, the network optimization process analyzed customer locations, SKU categories per customer order, average annual shipment size and frequency,

and order densities to identify high-volume regions. After considering 22 possible new locations, the analysis revealed the optimal distribution network layout: five total facilities and a reorganization of the value-added packaging services to different locations. Results included improved customer service with an increase in one-day shipments to over 40% and a 6% annual reduction in freight costs, which more than offset the cost of operating two additional DCs.





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Critical to a successful roll-out is the development of an implementation plan.

IMPLEMENTATION: MAKING YOUR OPTIMIZED NETWORK WORK FOR YOU

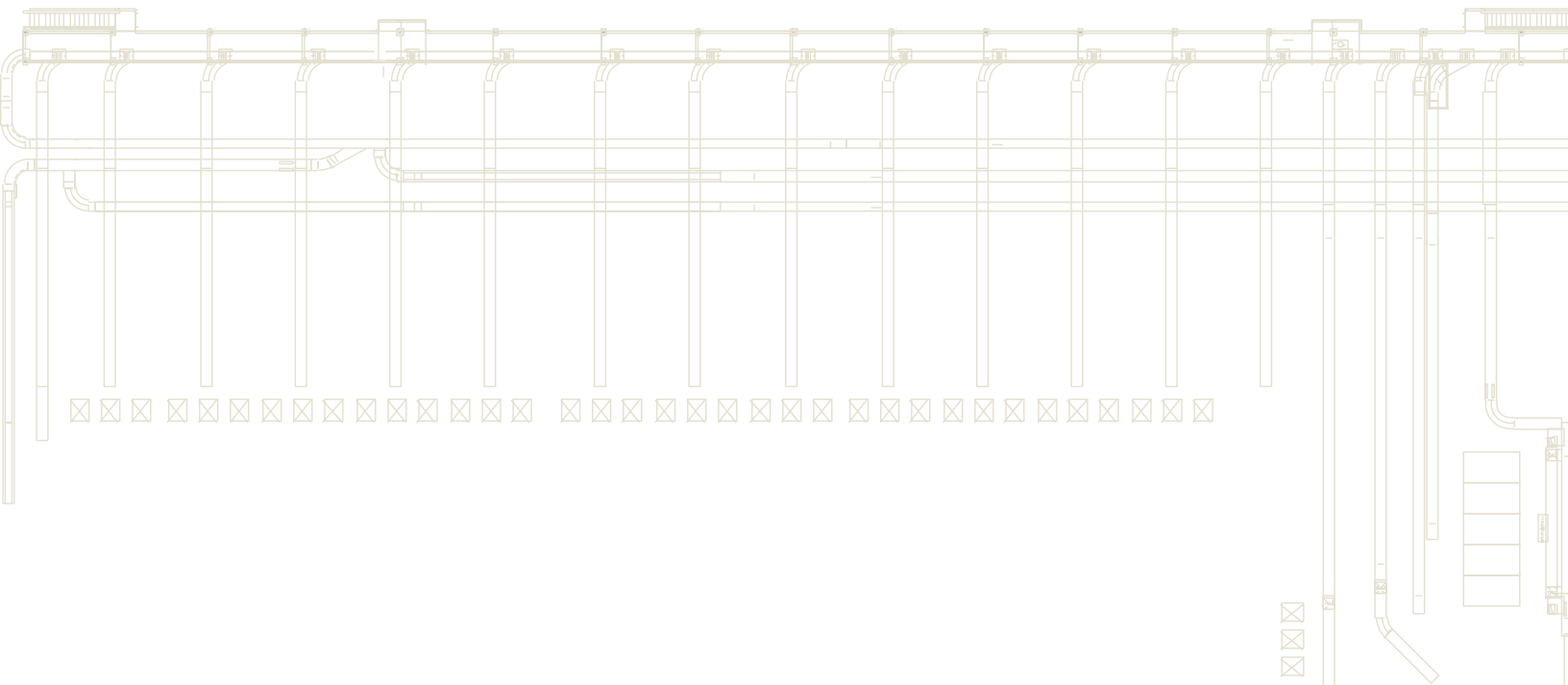
Now that the optimal future-state operations model has been selected, it's time to implement your supply-chain of the future. Critical to a successful roll-out is the development of an implementation plan. Planning short-term and long-term supply chain transitional events ensures a less complicated, successful conversion from old supply chain to new.

Short-term line items should be things that can be accomplished more easily, including freight negotiations, transportation route realignments and DC system reconfigurations. Long-term line items are the major changes that will take longer and be more complicated to implement, such as building a new DC, or closing an existing facility.

Present the time frame of the recommendations to senior management, identifying the maximum limits of your current network. This includes projecting the impact of adding staff, overloading handling practices, and maxing out capacity at certain DCs while you transfer processes from one location to another. Additional IT and warehouse staff may be needed to help handle the demands of the actual transition.

It's important to be clear on the additional resources and funds that will be needed to complete the optimized network implementation, even if the ultimate plan is to close one or more DCs.

Learn more about how FORTE's single-source project delivery system, CONTINUUM, ensures synchronization when implementing your network optimization implementation plan.—[Click here](#)



REGULAR MAINTENANCE: KEEPING YOUR NETWORK OPTIMIZED

So your optimized network has been redesigned to save money, increase efficiency, adapt to changes in demand or unforeseeable disasters, and it makes your customers happy. Now what?

As noted previously, a network optimization should be an on-going practice, not a one-time event. It's important to keep revisiting the process, because today's optimized network won't stay that way for long. In order to maintain a flexible supply chain that can successfully adapt to continuous change, a regular maintenance program needs to be put in place.

Establish KPIs throughout the network, and monitor that data diligently at a variety of frequencies: daily, weekly, monthly, quarterly, and annually. Items to watch include freight costs, delivery times, number of items shipped per lane, and split case pick levels. Evaluate this information to confirm that your optimized network is meeting expectations, and that it supports your supply chain strategy.

Any changes in corporate strategy, increases or decreases in demand, serving new customers or regions, operating cost increases, declining customer service levels, or consideration of a major capital investment are all occurrences that should trigger a return to the five-step process outlined on page 6.

Multi-plant, multi-DC companies will find that by turning network optimization into a process that can be quickly executed, they can continuously fine-tune their network as often as necessary. By re-running the network optimization at the first sign of a new variable, these logistics executives know the exact impact and can adjust the service footprint of different DCs to deal with that change in the most equitable and non-threatening manner to the business. For those in a fairly stable business environment, however, revisiting the process just once or twice a year might do the trick.

Remember, network optimization is a process, not a quick solution. But by adopting a consistent, on-going approach to synthesizing corporate goals and customer demands with a flexible, adaptable supply chain, you'll be well on your way to delivering better service at reduced cost.

Establish KPIs throughout the network, and monitor that data diligently at a variety of frequencies.

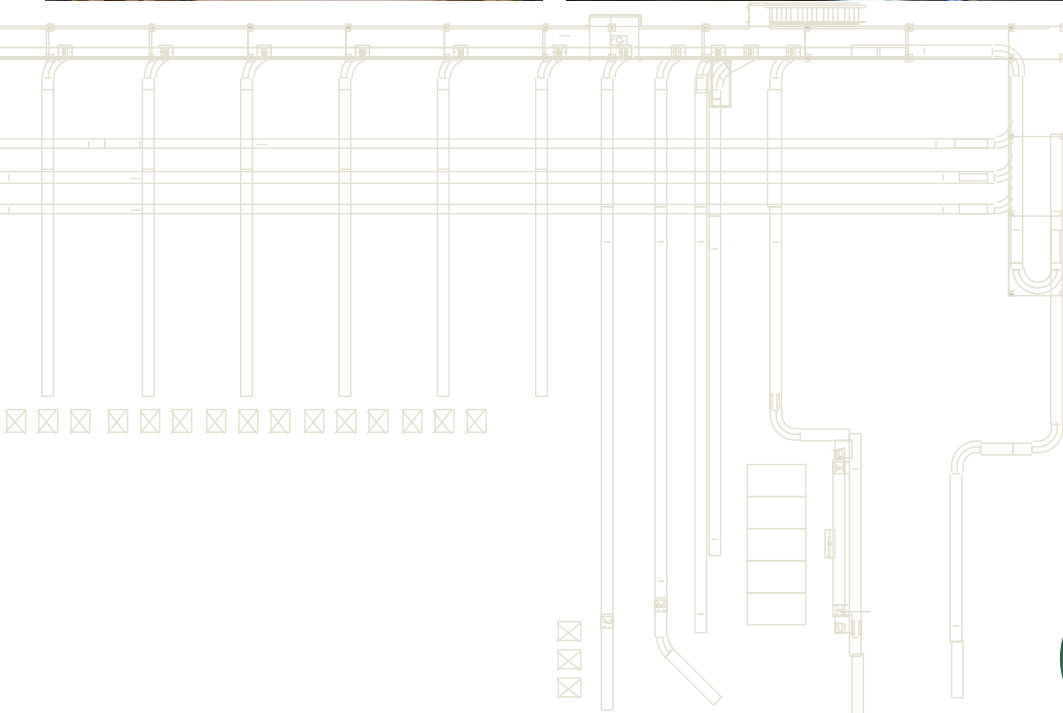
Please contact Louie Hollmeyer at lhollmeyer@forte-industries.com with questions and feedback regarding this whitepaper and the process of network optimization.

ABOUT FORTE

Leading companies are embracing FORTE's advanced CONTINUUM™ methodology. In doing so, they are widening the performance gap over competitors and creating competitive advantages in their supply chain. Quite simply, they are distributing at the least cost, driving improved margins, and increasing profitability.

We have a national client base of Fortune 500 organizations, and fast-growing mid-market and small entrepreneurial enterprises. We're proud of the company we keep and welcome the opportunity to help you craft your optimal Distribution On Demand solution.

**FORTE helps small companies grow larger,
and large companies grow stronger.™**



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