

AUTHOR:

Daria Batrakova
Director Business Line
Telecom Solutions

Guide to Software-Assisted Mobile Site Management, Part 1: Nominal Planning and Best Candidate Selection

Everything you need to know about finding new mobile site candidates for the Radio Access Network

MOBILE NETWORKS POWER MODERN LIFE

Consumption of mobile data is skyrocketing, driven largely by changes in the way we work, consume media, and communicate. Some of the biggest drivers of demand in the mobile industry are unlimited data plans, advanced devices and increasing mobile video consumption. We are connecting to more devices and using them in ways that require greater speed and bandwidth. In short, everything about the way we live our lives in some way relies on the ability to connect to a network. Cellular sites are the first essential encounters behind these connections.

Increasing network bandwidth and capacity is therefore a high priority for mobile network operators (MNOs). It is spurring their efforts to densify existing 4G and accelerate new 5G deployments. 5G gives networks the additional bandwidth they need to enable transmission of massive

amounts of data and to ensure services reach users and devices wherever they are located, with minimal latency.

Radio Access Network (RAN) rollouts add to the demands for the backbone network infrastructure. New 5G radio doesn't broadcast as far as older 4G versions, therefore more sites are needed to fill in coverage gaps, and the Mobile Backhaul Network (MBN) must keep up with the new requirements. MBN is essential both to 4G and 5G, so any MNO or telco provider who operates a regional distributed transport network is making the upgrade of the MBN a top priority.

MOBILE SITE CANDIDATE IDENTIFICATION HAPPENS FIRST

As stated, RAN relies on a huge number of cell sites to enable adequate coverage. These sites include the entire set

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of equipment needed to receive and transmit radio signals for cellular services, as well as equipment to process these signals. A typical cell site will include antenna systems, RF units, power amplifiers, combiners, filters, a baseband unit (BBU), a power supply and network interface modules.


Behind each cell site there is a whole selection and build process. Only one candidate out of multiple alternatives will be considered for build. The types of sites needed within the network vary greatly, from small cells to distributed antenna systems (DAS) to macro towers. Every site candidate has to be evaluated to ensure it is fit for the purpose. Towers, which are large structures, may have to adhere to height restrictions; small cells, which operate at higher frequencies, are subject to strong emitting power limitations. In short, a potential site must tick a lot of checkboxes before the design and build can even start.

The process of finding, planning and bringing new mobile sites on air is arduous and time-consuming. Often there will be a site acquisition project manager whose role is to research sites, evaluate candidates, and negotiate leases for selected locations. When evaluating a location, access to power supply and a backbone transport network (or wireless line-of-sight) are big technical considerations. Equally important are length of contract with the property owner (a decade or more assurance is typically required) and approval from local authorities. Securing environmental, safety and building permits is an absolute precondition. Now multiply these factors by the tens of thousands of sites a 5G mobile network needs and the enormity of the effort comes into focus.

The steps that an operator must go through for every single new site include:

 **Identify site candidates.** First, a need for new mobile coverage is acknowledged. This is a theoretical cell site, or a specific place or location on a map that the provider needs to address. Such sites are usually an outcome of nominal crude radio planning or community feedback (service complaints). Each theoretical cell has a definite search radius. The resulting search ring is often assigned to a site acquisition agent, who must identify several candidate locations within the ring. Once candidate sites within the ring are identified, the real work begins.

 **Collect data.** Data pertaining to all possible candidate sites is collected so candidates can be reviewed. A tremendous amount of information is generated and processed. Candidate characteristics are submitted in various forms: it could be an email from a subcontractor with results of a site survey, a table with line-of-sight measuring results, or a PDF scan of a safety certificate.

 **Analyze candidates.** To assess whether a proposed site is fit for the task, the candidates must be assessed in context and rated accordingly. For example, for remote locations or places where commercial

power is not easily accessible, site power must be supplied by a generator or solar panels. This is important information to have during site rating. Finally, local zoning and use permit regulations tied to the site must be known. No matter how attractive a site may be, if it's not compliant it's off the table. The viable sites are rank ordered, the agent proposes a best candidate terms and, when agreement is reached between all parties, the detailed site design and build process can be started.

HOW SOFTWARE MAKES IT EASIER

Software solutions make it easier to find, plan and document all facets of the RAN rollout process. Given the sheer volume of considerations, requirements and details, any efficiency gains that can be realized anywhere in the process will yield big savings. Software features that have the biggest impact on the process and ultimately the bottom line include:

- **One central rollout database.** Rollout project managers need to know exactly which sites are available and have access to detailed information about them. The core of FNT Command is a verified inventory of all sites, their infrastructure assets, active equipment, cabling, power, cooling and configurations. Combined with collected acquisition information, all physical, logical and virtual resources are stored in a single database and managed holistically to get the complete view needed for decision making. This approach also enables transport network engineers to concentrate on planning the new backhaul links, POPs and edge datacenters – all using the same database!

Such a database, which serves as a digital twin of the network, is a big strategic asset.

FNT Command delivers a digital twin by bringing all information together. The contents are created by numerous users working with the system as well as via integrations with various workflow and engineering systems, powered by **FNT IntegrationCenter**. Any relevant data can be integrated into the FNT database, including schematic and georeferenced representations of fiber optic connections, documents, and even details about the cable routing to the roof tops are represented.

- **GIS.** A combination of GIS-based location intelligence and network infrastructure details greatly impacts the efficiency of site selection and management. **FNT GeoMaps**, a product in the **FNT Command Platform**, enables a georeferenced way of working with mobile RAN and its backhaul connections. Integrating GIS-based location intelligence with the digital twin of the network takes site management to another level by enabling users to visualize sites and site candidates

on maps and analyze information about site acquisition status. It's important to note that, along with RAN, POPs can also be viewed on the same map.

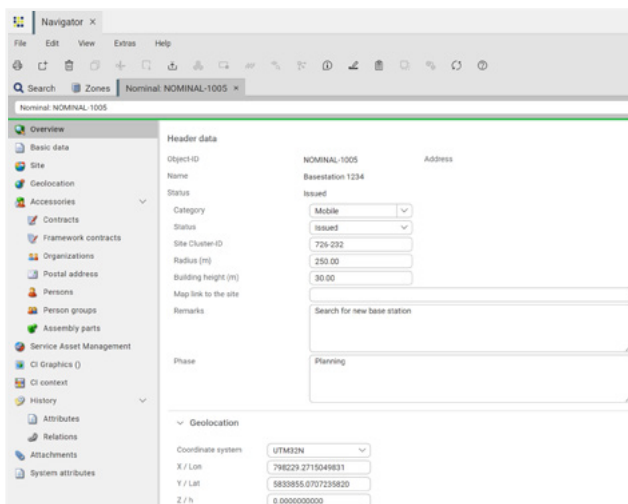
The combination of location intelligence with site data, site equipment and network infrastructure details enable planners to streamline the fiber and microwave deployments needed to connect the sites.

- **Analytics.** A site is selected for further development based on how well it matches to certain criteria. Making that determination is more efficient and accurate when aided by **FNT Analytics**, which contains various best practice dashlets that automate analyzing theoretical sites and candidates with their relations. These dashlets do the heavy lifting and deliver reliable, objective answers to the evaluator's most pressing questions.
- **A "friendly site" information bank.** Just because a site was not selected at one time doesn't mean it won't be added to the network at a later date. It is therefore important to retain the information collected. **FNT Command** stores information collected about sites that were not selected and makes it available for later profiling and rating. It stores real estate and facility documentation in its content management system, similar to how technical information about infrastructure assets and resources is documented.

EXAMPLE WITH FNT COMMAND

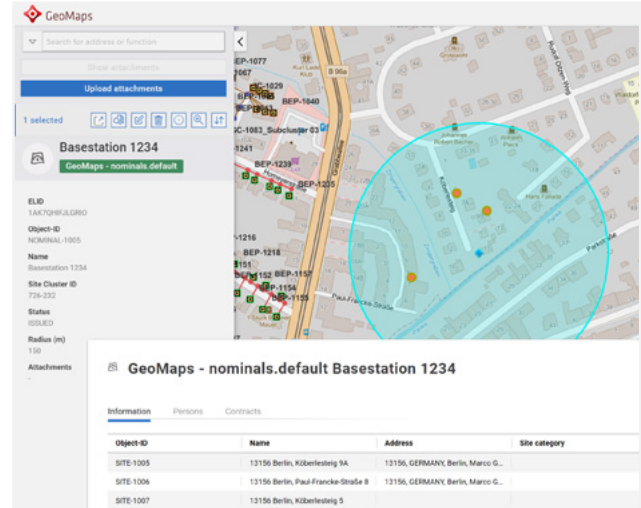
Site selection is a complicated process made easier with software like FNT Command. The following example walks through how FNT Command can be used for planning and storing of site candidates.

1. Before any work can begin, a nominal site must first be created in FNT Command. A nominal represents the search area for a future site. It must be supplied with its geo-coordinates and a search radius.



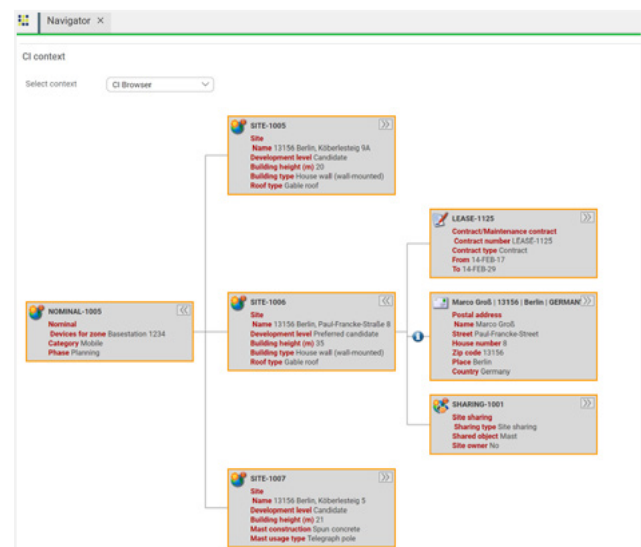
Main Nominal Tab in Navigator in FNT Command

2. Assuming that the "friendly sites" were populated into the FNT Command database independently from nominals, the search for a best candidate can now begin. A nominal is visualized in FNT GeoMaps with toggled radius. Performing a radius search of a nominal in FNT GeoMaps will yield candidate sites, which are your buildings, poles, and existing partner sites.



Nominal and candidates view in FNT GeoMaps

3. Performing a radius search in FNT GeoMaps allows site candidates to be assigned to the requested nominal site in FNT Command. From now on each candidate can be supplied a variety of additional information needed for profiling and rating. Such information includes existing contractual relations with owners and site sharing information.



Nominal relationships view in CI Browser in FNT Command

Based on the best match to certain criteria, one site candidate is selected for further development. At this point, a physical location may be linked, and further documents associated.

PUTTING IT ALL TOGETHER

This overview of the mobile site selection process is intended to highlight what's involved in finding new sites to add to the RAN. Given that every site has an impact on the network and service quality, it's vital to get this part right. That's why using software to support the process is recommended. Software enables automation of the various steps which speeds things up, reduces the margin of error, and improves the quality of decisions made along the way.

But finding a new site is only beginning. Much more has to happen to make the site functional. After a best site candidate is selected, planning and procurement of site

assets must then commence. Due to their complexity, these assets need highly sophisticated rollout management. There will be hundreds, if not thousands, of configuration parameters per site, per technology. The same software used to facilitate site selection can also be used for this as well. Read [part two of our Mobile Site series](#) to learn more about how.

Since being founded in 1994, FNT Solutions has been used by 500+ customers and 25,000+end users around the globe to provide accurate, reliable network infrastructure documentation and management.



[Contact us](#) to speak with one of our experts or schedule an introductory demo. Let us show you how FNT Solutions can connect all the dots of your hybrid infrastructure needs.



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