



## WIRELESS SPECTRUM AUCTIONS CONSULTING

With growing needs for mobile broadband connectivity, there is increased demand for wireless spectrum: for more bandwidth overall, and in more bands than ever before. Wireless spectrum auctions are increasingly becoming “inflection points”—defining moments when this scarce natural resource is made available and offered for public bidding in the form of valuable, long-term wireless spectrum licences.

The necessity for participation in an auction and the imperative of winning desired licences—which are needed to sustain the wireless business in the long run—can be stressful for wireless operators and can create anxiety on many fronts: business, financial and technical. The requirement to fully understand procedural and mathematical complexities of modern auction formats such as Simultaneous Multiple Round Ascending (SMRA), Combinatorial Clock Auction (CCA) and many variants of these, and to understand all associated auction rules and restrictions—can be overwhelming for many wireless operators.

Nordicity has a strong and unique combination of expertise and experience in technical, economic/financial, regulatory policy and business areas related to spectrum auctions. This allows Nordicity to offer a **full portfolio of consulting services** covering all phases and aspects related to operators’ participation in spectrum auctions: auction training (formats and rules); pre-auction preparation (including business valuation of existing and desired spectrum licences); business modelling; detailed preparation of bidding strategy and tactics; auction simulation; evaluation of complex gaming scenarios; “what-if” auction outcome and payout analysis; development of customized auction simulators and detailed auction tracking tools; full on-site (“war room”) and off-site logistical auction support.

Nordicity has worked for a number of mobile and fixed wireless operators globally, and has been engaged in helping with spectrum auctions in the most demanding regulatory and technical environments.

### SPECTRUM AUCTION SERVICES

- Pre-auction spectrum needs assessment
- Spectrum valuation (business valuation, benchmarking)
- Spectrum acquisition strategies (auctions, licencing, sub-licencing, business partnerships)
- Auction training (all auction formats and rules)
- Pre-auction preparation (competitive analysis; auction strategy and tactics; definition of bidding flow/process)
- “War room” support (full bidding support)
- Post-auction spectrum planning support
- Full auction design; help with public consultations and end-to-end delivery of auctions (for national regulators)

### AUCTION FORMATS AND TOOLS

- Support for all types of auctions (sealed-bid, forward, reverse, SMRA, CCA, single-band/multiband, variants)
- Support for diverse auction activity rules (e.g. revealed preference rules) and constraints (e.g. spectrum caps)
- Auction Simulation Tool (server-based and PC-based)
- Bidding Tracking Tool
- Auction Tracking Tool (round by round tracking)
- Winning and Price Determination Tool (WPD)
- Other customized auction calculators and tools (MS Excel, stand-alone, server-based)
- Geo-mapping and detailed analysis of spectrum licences

## NORDICITY'S SPECTRUM AUCTIONS TEAM

**Stuart Jack, M.Sc., MBA, – Partner, Telecom Lead and Head of Ottawa office.**

Expertise: Strategic market analysis; financial and technology analysis; business plan development; regulatory frameworks; capacity-building. Auction strategy. Spectrum planning and valuation.

**Alex Pavlovic, B.Sc. EE, M.Sc. EE. – Director of Technology.**

Expertise: Telecommunications strategies; wireless and wireline technology analysis and modelling; engineering analysis and design. Auction strategy and tactics; auction simulation; “what-if” scenario analysis.

**Tanveer Ahmed, MBA, CPA, CMA – Senior Manager, Finance and Economic Analysis.**

Expertise: Regulatory economics; service costing; investment valuation; business case modelling and due diligence. Spectrum valuation and benchmarking.

**Carleton University: Dr. Jason Gao, Full Professor,** with a team of Mathematics and Computer Science programmers. Expertise: Gaming theory and applications to auctions. Mathematical modelling of auctions and software development.

Nordicity has an extensive network of trusted business partners and associates across the world. This allows Nordicity to provide its services to wireless operators worldwide and respond to any needs related to spectrum auctions (regulatory, technical, planning, legal, large project management, in-depth local knowledge, regional presence and local language).

## RECENT WORK RELATED TO SPECTRUM AUCTIONS: HIGHLIGHTS

**March - May 2015:** For a **Canadian national wireless operator** - full auction support in the Industry Canada's 2500 MHz Broadband Radio Service (BRS) combinatorial clock auction (CCA): pre-auction preparation (including business valuation of existing spectrum and future spectrum needs); auction training; auction simulation; investigation of “what-if” scenarios and outcomes; “war-room” auction support - auction tracking, on-site support and help with tactical execution of bidding. For this project, Nordicity teamed up with **Carleton University** and **Centre for Quantitative Analysis and Decision Support (CQADS)**, delivering a customized, server-based auction simulation and training tool which encompassed the clocking rounds phase and the supplementary phase (OR bidding) and included a Winner and Price Determination module.

**2014:** For a **Canadian regional wireless operator** - provided support in the Industry Canada's 700 MHz auction combinatorial clock auction (CCA): pre-auction preparation (including business valuation of existing spectrum and future spectrum needs); auction training; auction simulation using online (server-based) auction simulator. For this project, Nordicity partnered with **Carleton University** and **Centre for Quantitative Analysis and Decision Support (CQADS)**, delivering an innovative server-based auction simulation and training tool.

**2014:** For **Columbus Communications (Trinidad and Tobago)** - provided assistance in the development of a bid for new spectrum licences (700 MHz, 800 MHz and 1900 MHz) and subsequent market entry as a wireless telecommunications services provider. The work included: competitive analysis of the local wireless market; technical spectrum audit; spectrum planning advice and training; full network design including definition and pricing of services; rollout planning; and financial forecasting.

**2008:** Assisted **EastLink (Bragg)**, a new entrant in the Canadian wireless telecommunications market with the preparation of its auction strategy, the development of its bid tracking and forecasting model, as well as bidding support during the 2008 Industry Canada's auction for Advanced Wireless Services (AWS-1) in the 2 GHz (SMRA format). The Nordicity team included key global resources from Kalba International (New Haven, CT, USA) and Coutts Communications (Adelaide, Australia) in the development of the bid model and strategies.

**2007:** For **Telecommunications Authority of Trinidad and Tobago (TATT)**, working with PricewaterhouseCoopers (Trinidad) - provided audit (PwC), technical and financial (Nordicity) and legal expertise (Johnson, Buchan) related to the 2007 broadband wireless access (BWA) auction. The team assisted TATT in the preparation of the auction rules, bidders' agreements and other documents; provided advice on the reserve price and minimum bid increments, and fully managed the auction process and provided legal expertise.

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