

PROSPECTS FOR CELLULAR BACKHAUL IN FAST-GROWING ECONOMIES

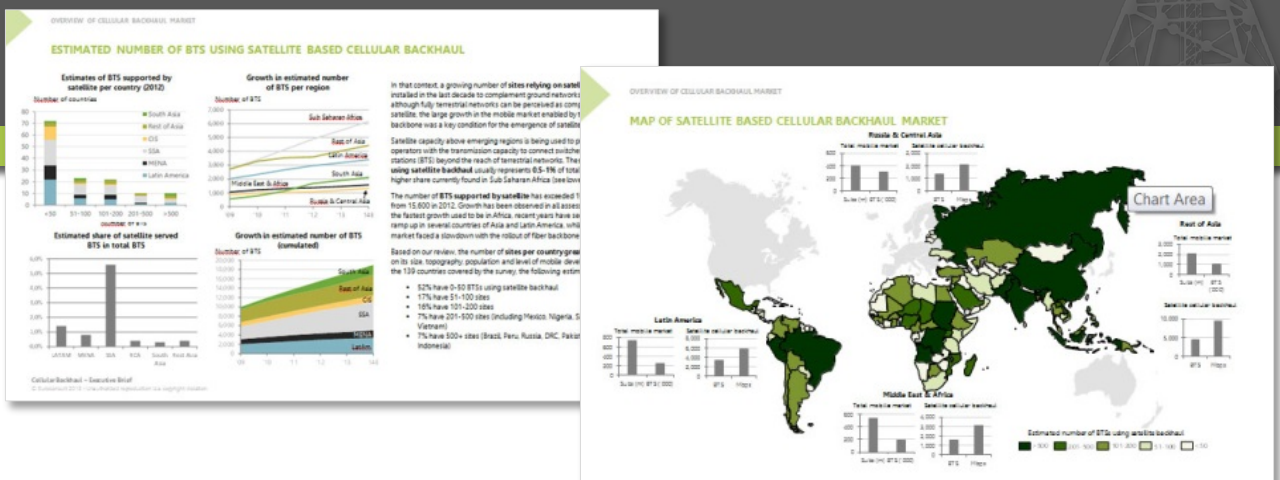
2015 Edition | A Euroconsult **Executive Report**

An assessment of the market size, key dynamics and drivers for cellular backhaul over satellite in fast-growing economic regions.

- ✓ 50 pages
- ✓ Over 90 graphs & tables
- ✓ Thousands of data points
- ✓ Comprehensive PDF & Excel files
- ✓ Price starting at € 3,500

Capacity revenues from cellular backhaul in fast-growing economies could reach over \$1 billion by 2025, up from around \$550 million in 2014, corresponding to a 6% CAGR over the ten-year period. These numbers reflect a sustained increase in the number of sites using satellite backhaul, leading to around 37,000 sites by 2025. These forecasts also recognize a 14% CAGR in traffic carried that should reach around 150 Gbps by 2025, along with a corresponding 8% CAGR for capacity used in MHz reaching close to 45 GHz by 2025, when taking into account spectrum efficiency.

High Throughput Satellite (HTS) usage remained limited to a few regions and certain payloads until recently due to, among other factors, the cautious nature of industry adoption and ramp-up. An important driver for increased traffic over HTS systems moving forward is 3G expansion, which can economically only be carried over HTS and thereby allay service providers' concerns over CAPEX needs and network availability.



ABOUT PROSPECTS FOR CELLULAR BACKHAUL IN FAST-GROWING ECONOMIES

HIGHLIGHTS OF THE EXECUTIVE REPORT:

- ✓ New report format, including over 90 tables/graphs
- ✓ Market sizing and value chain for cellular backhaul over satellite
- ✓ Key drivers (economic, technical, government, regulatory etc.)
- ✓ Focus on the conditions for carriage of 3G traffic over satellite and on the impact of HTS
- ✓ Excel databases with selected past and current indicators for over 130 countries (population, mobile subscriptions, estimated range of satellite sites)
- ✓ 10-year regional forecasts for satellite sites, traffic, bandwidth and capacity revenues

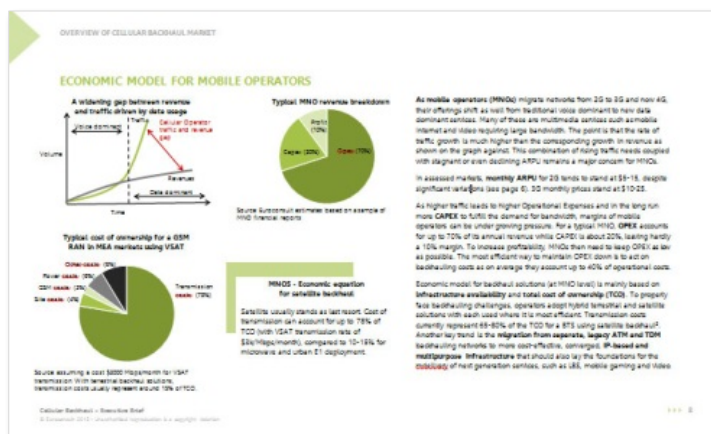
METHODOLOGY:

Prospects for Cellular Backhaul in Fast-Growing Economies” is a focused analysis built on several core elements including:

- Primary research involving interviews with more than 20 stakeholders over the value chain in the different world regions, representing ground equipment suppliers, satellite operators, telecom operators and service providers
- Secondary research that involved a broad review of public information including reports from government organizations, financial reports, press releases, articles and other sources
- Our participation in over 30 international events per year in the different world regions

Analysis

Reference indicators



Highlights & case studies

TABLE OF CONTENTS

OVERVIEW OF THE CELLULAR BACKHAUL MARKET

- > Overview of trends in the cellular market
- > Global mobile penetration and population coverage
- > Economic model for mobile operators
- > Overview of the value chain for cellular backhaul
- > Satellite backhaul process for macro and small cells
- > Operating process for satellite-based cellular backhaul
- > Estimated number of BTS using satellite-based cellular backhaul
- > Current satellite capacity used for cellular backhaul
- > Satellite backhaul vs other alternatives
- > Map of satellite based cellular backhaul market

DRIVERS FOR FUTURE GROWTH

- > Extension of cellular networks and market
- > Universal access and support funds
- > Growth of 3G and 4G networks and traffic
- > Business case of 3G backhaul over satellite
- > Network optimization and spectrum efficiency
- > Changes at the level of base stations
- > Small cells with BTS sharing finding traction even in advanced mobile markets
- > HTS deployments remain limited so far in emerging regions
- > HTS Systems: Challenges and opportunities
- > Case: Successful rural 3G deployments
- > Roadmap for cellular backhaul over satellite – from 2G to 3G focus
- > Synthetic SWOT analysis for cellular backhaul
- > Synthesis of market forecasts

REGIONAL MARKET ANALYSIS

LATIN AMERICA
MIDDLE EAST & NORTH AFRICA
SUB-SAHARAN AFRICA
RUSSIA & CENTRAL ASIA
SOUTH ASIA
REST OF ASIA

Regional overviews, including:

- > Size and dynamics of the mobile market
- > Current satellite use in terms of sites, traffic and capacity

Growth drivers, including:

- > Prospects for the mobile market
- > Focus on trends in mobile broadband (3G and beyond)
- > Focus on key countries for satellite use
- > Traffic and spectrum efficiency
- > HTS deployment & adoption

Forecasts through 2024, including:

- > Mobile base stations using satellite backhaul (2G, 3G connectivity)
- > Traffic carried over satellite in Mbps
- > Satellite capacity usage in MHz (Regular capacity, HTS)
- > Capacity revenue (Regular capacity, HTS)

TABLES & GRAPHS

01\ OVERVIEW OF CELLULAR BACKHAUL MARKET

OVERVIEW OF TRENDS IN THE CELLULAR MARKET:

- MOBILE SUBSCRIPTIONS IN ASSESSED REGIONS (2010-2015)
- TYPICAL CURRENT ARPU FOR MOBILE SERVICES
- ESTIMATED TOTAL NUMBER OF MOBILE BASE STATIONS (2015 VS. 2020)

GLOBAL MOBILE PENETRATION AND POPULATION COVERAGE:

- MOBILE PENETRATION BY REGION (2010 VS. 2015)

ECONOMIC MODEL FOR MOBILE OPERATORS:

- A WIDENING GAP BETWEEN REVENUE AND TRAFFIC DRIVEN BY DATA USAGE
- TYPICAL MNO REVENUE BREAKDOWN
- TYPICAL COST OF OWNERSHIP FOR A GSM RAN IN MEA MARKETS USING VSAT

OVERVIEW OF THE VALUE CHAIN FOR CELLULAR BACKHAUL

SATELLITE BACKHAUL PROCESS FOR MACRO AND SMALL CELLS

ESTIMATED NUMBER OF BTS USING SATELLITE-BASED CELLULAR BACKHAUL:

- ESTIMATES OF BTS SUPPORTED BY SATELLITE PER COUNTRY (2012)
- GROWTH IN ESTIMATED NUMBER OF BTS PER REGION
- ESTIMATED SHARE OF SATELLITE SERVED BTS IN TOTAL BTS
- GROWTH IN ESTIMATED NUMBER OF BTS (CUMULATED)

CURRENT SATELLITE CAPACITY USED FOR CELLULAR BACKHAUL:

- ESTIMATED TRAFFIC USED BY BTS USING SATELLITE BACKHAUL
- ESTIMATED NUMBER OF REGULAR TPES USED FOR CELLULAR BACKHAUL
- ESTIMATED CAPACITY USED ON HTS SYSTEMS FOR CELLULAR BACKHAUL
- ESTIMATED CAPACITY USED ON HTS SYSTEMS FOR CELLULAR BACKHAUL

SATELLITE BACKHAUL VS OTHER ALTERNATIVES:

- TRANSMISSION COST COMPARISON OF CELLULAR BACKHAUL ALTERNATIVES
- LATENCY ASSOCIATED WITH SATELLITE AND MICROWAVE BACKHAUL USAGE

MAP OF SATELLITE-BASED CELLULAR BACKHAUL MARKET

02\ DRIVERS FOR FUTURE GROWTH

EXTENSION OF CELLULAR NETWORKS AND MARKET:

- SUBSCRIPTIONS TO MOBILE SERVICES BY REGION
- MOBILE PENETRATION BY REGION (IN PERCENTAGE OF POPULATION)

UNIVERSAL ACCESS AND SUPPORT FUNDS

GROWTH OF 3G AND 4G NETWORKS AND TRAFFIC:

- ESTIMATED GROWTH IN 3G PENETRATION
- SMARTPHONE CONNECTIONS
- ESTIMATED GROWTH IN 4G PENETRATION

BUSINESS CASE OF 3G BACKHAUL OVER SATELLITE:

- SATELLITE CAPACITY COST (ESTIMATE FOR YEAR 2017)
- TCO FOR 3G BTS USING SATELLITE AND RESULTING ARPU REQUIRED
- CURRENT MOBILE ARPU LEVELS (MOSTLY 2G) AND RANGE OF 3G PRICE PLANS

NETWORK OPTIMIZATION AND SPECTRUM EFFICIENCY:

- SPECTRUM EFFICIENCY - PREVIOUS STREAM OF INNOVATION
- SPECTRUM EFFICIENCY TREND FOR CELLULAR BACKHAUL

02\ DRIVERS FOR FUTURE GROWTH CONTINUED

CHANGES AT LEVEL OF BASE STATIONS:

- ❑ LARGE DECREASE IN EQUIPMENT COST OF MOBILE BTS HAS BOOSTED DEMAND...
- ❑ ...WHILE THE REGULAR CAPACITY VSAT TERMINAL PRICES GET STABILIZES (2003-2015)

SMALL CELLS WITH BTS SHARING FINDING TRACTION EVEN IN ADVANCED MOBILE MARKETS

- ❑ MULTI OPERATOR CORE NETWORK WITH SHARED RNC

HTS DEPLOYMENTS REMAIN LIMITED SO FAR IN EMERGING REGIONS

- ❑ ESTIMATED RANGE OF CAPACITY PRICING AND LATENCY, HTS SYSTEMS VS. REGULAR
- ❑ ESTIMATED RANGE OF CAPACITY AVAILABLE IN A BEAM OF AN HTS SYSTEM
- ❑ SAMPLE OF CAPACITY CONTRACTS SIGNED WITH HTS SYSTEMS AND INVOLVING CELLULAR BACKHAUL SERVICES

HTS SYSTEMS: CHALLENGES AND OPPORTUNITIES

- ❑ O3B TERMINAL PRICE RANGE DEPENDING ON ANTENNA SIZE / CAPACITY REQUIREMENTS

CASE: SUCCESSFUL RURAL 3G DEPLOYMENTS

NETWORK DESIGN FOR MCPC PROJECT

TRENDS IN CAPACITY PRICING

- ❑ CAPACITY PRICING FOR CELLULAR BACKHAUL IN REGULAR C- AND KU-BANDS
- ❑ CAPACITY PRICING FOR CELLULAR BACKHAUL ON HTS SYSTEMS
- ❑ AVERAGE CAPACITY PRICING FOR CELLULAR BACKHAUL IN 2014 BY REGION

ROADMAP FOR CELLULAR BACKHAUL OVER SATELLITE - FROM 2G TO 3G FOCUS

SYNTHETIC SWOT ANALYSIS FOR CELLULAR BACKHAUL

SYNTHESIS OF MARKET FORECASTS:

- ❑ MOBILE BASE STATIONS USING SATELLITE BACKHAUL
- ❑ TRAFFIC CARRIED OVER SATELLITE BY TYPE OF MOBILE BTS
- ❑ SATELLITE CAPACITY USAGE, BREAKDOWN BY TYPE OF PAYLOAD
- ❑ SATELLITE CAPACITY REVENUE, BREAKDOWN BY TYPE OF PAYLOAD

SYNTHESIS OF MARKET FORECASTS:

- ❑ MOBILE BASE STATIONS USING SATELLITE BACKHAUL BY REGION
- ❑ SATELLITE TRAFFIC BY REGION
- ❑ SATELLITE CAPACITY USED BY REGION
- ❑ SATELLITE CAPACITY REVENUE BY REGION

03\ REGIONAL FOCUSES

GRAPHS FOR EACH REGION:

- ❑ MOBILE BASE STATIONS USING SATELLITE BACKHAUL
- ❑ TRAFFIC CARRIED OVER SATELLITE BY TYPE OF MOBILE BTS
- ❑ SATELLITE CAPACITY USAGE, BREAKDOWN BY TYPE OF PAYLOAD
- ❑ SATELLITE CAPACITY REVENUE, BREAKDOWN BY TYPE OF PAYLOAD

INCLUDES REGIONAL MAPS OF CELLULAR BACKHAUL MARKET OVER SATELLITE

SUPPORTING DATABASES BY REGION

TOTAL MOBILE MARKET (2006-2024)

- POPULATION
- MOBILE SUBSCRIBERS
- 3G SUBSCRIBERS
- ESTIMATED NUMBER OF MOBILE BTS

SATELLITE MARKET FOR CELLULAR BACKHAUL DATA PER COUNTRY (2006 AND 2014)

- RANGE OF SATELLITE SITES INSTALLED
- RANGE IN TRAFFIC (MBPS)
- RELATED CAGR

CONSOLIDATED FIGURES FOR THE REGION (2006-2024)

SATELLITE SITES INSTALLED

- 2G CONNECTIVITY
- 3G CONNECTIVITY
- TOTAL SITES

SATELLITE TRAFFIC (MBPS)

- AVERAGE TRAFFIC PER 2G SITE
- AVERAGE TRAFFIC PER 3G SITE
- TOTAL TRAFFIC

SATELLITE TRAFFIC BY TYPE OF PAYLOAD (MBPS)

- REGULAR CAPACITY
- HTS CAPACITY

AVERAGE SPECTRUM EFFICIENCY (MHZ PER MBPS)

- FOR 2G SITES
- FOR 3G SITES
- AVERAGE

SATELLITE CAPACITY BY TYPE OF PAYLOAD (MHZ)

- REGULAR CAPACITY
- HTS CAPACITY

36 MHZ EQUIVALENT TPES

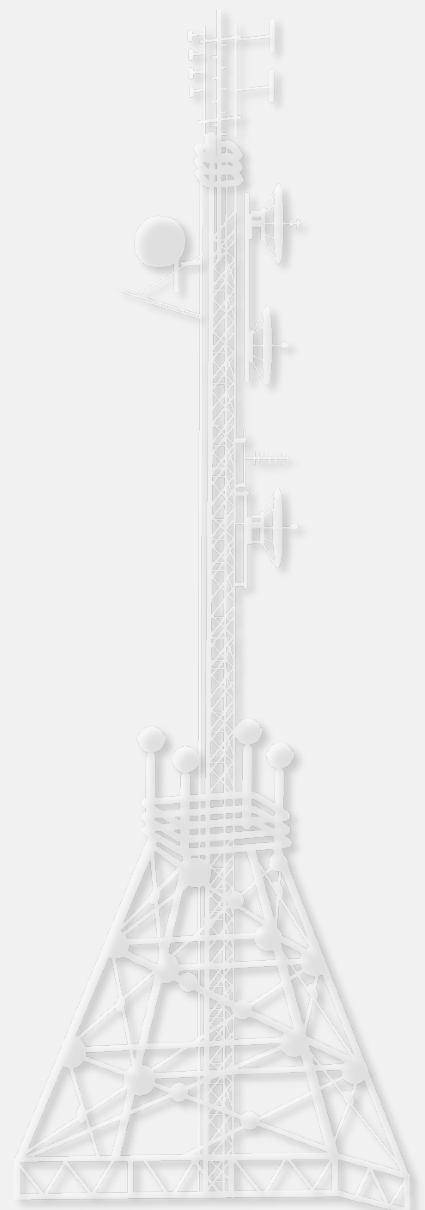
- REGULAR CAPACITY
- HTS CAPACITY

SATELLITE CAPACITY BY FREQUENCY BAND (MHZ)

- C-BAND
- KU-BAND
- KA-BAND

SATELLITE CAPACITY REVENUES (\$M)

- REGULAR CAPACITY
- HTS CAPACITY



EUROCONSULT THOUGHT LEADERSHIP

Celebrating over **30 years** of expertise

Euroconsult is the leading global consulting firm specializing in space markets. As a privately-owned, fully independent firm, we provide first-class strategic consulting, develop comprehensive research, and organize executive-level annual summits for the industry. With more than 30 years of experience, Euroconsult is trusted by 600 clients in over 50 countries. We rely on a multi-cultural team of over 30 full-time experts. Euroconsult is headquartered in France, with offices in the U.S., Canada, and Japan.

EUROCONSULT RESEARCH

Over the past 30 years, Euroconsult has maintained an unparalleled expertise in assessing trends in satellite services and in the digital broadcasting industry. We collect, update and assess on a yearly basis detailed market, industry, policy, program and financial information internationally. We have developed proprietary databases and forecast models that are systematically applied and are central to the publication of thematic research reports. The consistency of the approach is an essential quality trusted by leading organizations that are regular users over the years.

Euroconsult research focuses on the assessment of the industry including its structure, market players, revenues and dynamics. Research reports include long-term trends, commercial/ programmatic

and economic benchmarking, up-to-date information, and ten year forecasts supported by key ratios. With research published on an annual and biennial basis, these surveys have been used as reference tools by most public and private stakeholders involved in our sectors of expertise.

- ✓ Industrial companies
- ✓ Government programs & policies
- ✓ Satellite communications
- ✓ Earth observation
- ✓ Digital broadcasting
- ✓ and more...

We are trusted experts in the satellite industry, advising the world's leading businesses and governments.

OTHER SELECTED RESEARCH PROVIDED BY EUROCONSULT

Visit our Online Store at euroconsult-ec.com/shop

Prospects for the Small Satellite Market, 2015 edition

Satellite Value Chain: The Snapshot, 2014 edition

Satellite Communications & Broadcasting Markets Survey, 2014 edition

Company Profiles: Analysis of FSS Operators, 2014 edition

Trends & Prospects for Emerging Space Programs, 2014 edition

VISIT EUROCONSULT-EC.COM FOR CONSULTING SERVICES, TRAINING & SUMMITS



ORDER FORM

(1/2) (COPYRIGHT ON REVERSE SIDE IS MANDATORY)

PROSPECTS FOR CELLULAR BACKHAUL IN FAST-GROWING ECONOMIES 2015 EDITION

Please complete this form and return by e-mail to reports@euroconsult-ec.com or by fax to + 33 1 48 05 54 39. If you have any questions about ordering, would like to enquire about specific corporate licenses or would like to order for multiple locations and/or legal entities, please contact reports@euroconsult-ec.com or call +1 (514) 903-1001. **All prices are in Euros. All orders must be prepaid** (if not possible, please contact us). Applicable VAT taxes will be added in Euros.

1

Product		Price	Total
eFiles (Including additional Excel tables for key figures and a PDF of the report)	X	€ 3,500	
Additional eFiles license(s)	Qty:	€ 350	
Enterprise license	X	€ 8,750	
VAT if applicable companies based in France must add VAT 20%			
Product Total in Euros (€)			_____

3

Accounting Dept. E-mail: _____

4

Invoicing Address (Please use capital letters)

First name _____
 Last name _____
 Company name _____
 Occupation _____
 Address _____
 Zip Code _____ City _____
 State _____ Country _____
 Phone _____ Fax _____
 E-mail _____

5

Delivery Address (If different from invoicing address)

First name _____
 Last name _____
 Company name _____
 Occupation _____
 Address _____
 Zip Code _____ City _____
 State _____ Country _____
 Phone _____ Fax _____
 E-mail _____

2

Payment Information

Company VAT n° (required for all companies)

Credit Card

VISA Mastercard AMEX

Cardholder Name (as it appears on card)

Cardholder Number

Expiration Date (month/year) | Cryptogram (last 3 digits on the back)

Cardholder's Signature

Bank Transfer

(All bank charges are to be paid by the sender)

to EUROCONSULT, please NOTE IMPERATIVELY:
 Swift-BIC code: CC FR FR PP
 IBAN: FR76 3005 6007 9407 9403 1853 321
 Account n° 07940318533
 HSBC, 171 Rue de Rennes, 75006 Paris, France.

Cheque or Money Order Enclosed

Payable to Euroconsult:
86 Blvd. Sebastopol, 75003 Paris, France



COPYRIGHT AGREEMENT

(2/2) FOR REPORT FILES:

PROSPECTS FOR CELLULAR BACKHAUL IN FAST-GROWING ECONOMIES 2015 EDITION

Please complete and return the order form & copyright agreement by e-mail to reports@euroconsult-ec.com or fax to + 33 1 48 05 54 39. Each team user must sign a copy of the copyright agreement. Please complete the information below for each user of the research files.

Please read this license agreement carefully.
By using the report files, you are agreeing
to adhere by the terms of this license.

SINGLE USER LICENSE

- a) This product is licensed only for a team working together on a project, working on the same site in the same company. The person signing this agreement is responsible for the use of the research files. Euroconsult must be informed of all users of the research files before use. The information may not be shared with other company sites or other work teams in the same or other companies in any form, neither photocopied nor reproduced, including for internal use. The content of the report files may not be stored, transferred, or copied to any type of electronic storage device.
- b) No part or extract, in any format whatsoever, must be transmitted to any other organization, including cooperative entities and subsidiaries. All licenses purchased at the additional license price are for internal use only by the organization ordering (same company name, same location as indicated on original order form). Euroconsult must be informed of the users of the additional licenses purchased.
- c) All data or information extracted from the report files for use in other documents must rightfully use the copyright reference: *Euroconsult, name of report, year*. Before any other use of the information contained in the report files, prior written consent by Euroconsult is required.
- d) This Agreement shall in all respects be governed by the laws of the Republic of France. The user agrees that the proper jurisdiction and forum for the resolution of any claim arising under this license shall be at Euroconsult's sole option.

Research Report User

First name _____

Last name _____

Company _____

Occupation _____

E-mail _____

Date _____

SIGNATURE: _____

Research Report User (For additional user)

First name _____

Last name _____

Company _____

Occupation _____

E-mail _____

Date _____

SIGNATURE: _____