

## Satellite Cellular Backhaul

New Satellite Migration & Optimization

**NovelSat NS3000 modems running NovelSat NS3 and NovelSat DUET CeC technologies tripled bandwidth efficiency, saving the customer nearly \$9M annually.**



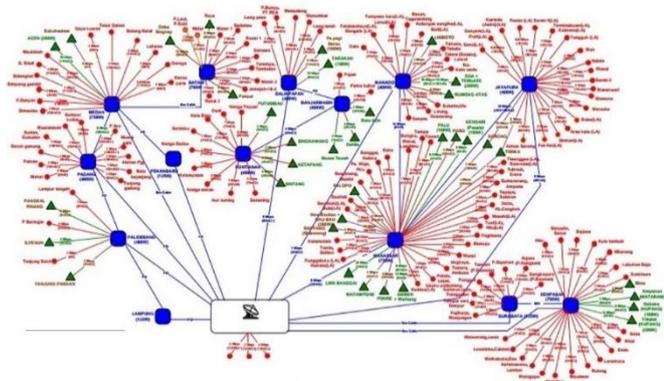
### Challenge

**A major Asian mobile telecom operator needed to prepare for the decommissioning of a communication satellite that they had been using as a part of their cellular backhaul network.**

**They took advantage of the opportunity to upgrade the spectral efficiency of their transmission solution and to implement a new Network Management System maintain and control the network.**

### Goals

**Migrate 180 E1 links to a new satellite and optimize efficiency to save as much satellite bandwidth – and operating costs – as possible.**



### Background

The customer's cellular backhaul network serves numerous remote sites in Asia. Its 180 E1 links are carried on ten 36MHz satellite transponders. Various types of links are supported, including Full E1 (2.048Mbps), Half E1 (1.024Mbps) plus 50Mbps inter-hub links. Transmission encoding was based on Turbo Code with 20% Roll-Off Factor.

NovelSat was selected over other solution providers for a number of reasons in addition to offering the best spectral efficiency and the quickest ROI. The NovelSat NS3000 modem offers unsurpassed flexibility, with up to 360Mbps data rate for bi-directional traffic on a single 36MHz transponder plus superior signal resilience for jamming and interference, weather fluctuations and phase noise. The NovelSat modem was also selected for its built-in high-end feature set whose options can be activated over the air with no additional hardware.

### NovelSat Solution

NovelSat NS3000 Professional Satellite Modems running NovelSat NS3 with 5% ROF met the customer's expectations for their upgraded cellular backhaul network. The number of transponders was reduced from 10 to 4 by increasing the number of E1 links per transponder from 18 to 57. The new solution reduced their satellite bandwidth costs by 69%, delivering a solution ROI of 3.3 months.

**For more information, please contact NovelSat at [info@novelsat.com](mailto:info@novelsat.com)**

NovelSat also deployed its technology-agnostic Network Management System (NMS) to enable control and maintenance of the new NovelSat NS3000 modems and the other equipment in the cellular backhaul network. The NMS deployment also included a redundant system to mitigate any potential downtime.

## Technology

The 280 NovelSat NS3000 Professional Satellite Modems used in this solution can support all major satellite transmission industry standards, including DVB-S and DVB-S2. However, to deliver the spectral efficiency demanded by this cellular backhaul solution, the customer chose to use the NovelSat NS3 high-end efficiency satellite transmission software package with 5% ROF. NovelSat NS3 typically delivers more than 30% more capacity per MHz of bandwidth compared with industry standard DVB-S2 technology. In this case, efficiency increased by 69% vs. the Turbo Code based solution that was replaced.

The solution also includes NovelSat DUET™ CeC™ (Carrier-echo-Cancellation) which doubles the capacity of each satellite carrier by reusing existing bandwidth for full multiplexed bi-directional transmission. Advanced AUPC (Automatic Uplink Power Control) is also used to automatically adjust power to compensate for uplink fade, effectively adding around 2dB to the link margin. These and many other features are built-in software defined options that are available on all NovelSat modems and conveniently require no additional hardware for their implementation.

These features made it possible for the customer to encode up to 57 E1 links per 36Mhz transponder compared to 18 in their previous solution.

All NovelSat satellite transmission products are built around NovelSat SMOS (Satellite Modem Operating System), a unified satellite communications platform that ensures optimal interoperability, throughput and scalability of capacity, software-upgradable high-end features and waveforms. The NovelSat NS3000 modem powers the satellite industry's most scalable point-to-multipoint transmission applications, enabling applications from 64Kbps to 425Mbps on a single carrier. It is this high-end spectral efficiency that makes satellite based cellular backhaul a cost effective solution for mobile operators.

	Existing Solution	NovelSat Solution
Required Bandwidth per E1 Link	2.0 MHz	<b>0.63 MHz</b>
E1s per 36MHz Transponder	18	<b>57</b>
Total required Bandwidth	360MHz	<b>113MHz</b>
Transponders (180 E1 links)	10	<b>3.15</b>
Operating Cost* Monthly / Annually	\$1,080K / \$12,960K	<b>\$339K / \$4,068K</b>
Operational Cost Reduction		<b>69%</b>
Annual Savings		<b>\$8.9M</b>
ROI		<b>3.3 Months</b>

\*Assume \$3000/MHz/Month

## Summary

NovelSat deployed 280 NS3000 Professional Satellite Modems and a technology-agnostic NMS to upgrade this large scale cellular backhaul network to enable optimized migration to a new satellite. With features such as NovelSat NS3, NovelSat DUET CeC, 5% ROF and built-in AUPC, NovelSat was able to additionally reduce the customer's bandwidth costs by \$8.9M annually, a 69% improvement over their previous solution, leading to a 3.3 month ROI.



NovelSat NS3000 Professional Satellite Modem

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