White Paper

Independent Backhaul Procurement For Mobile Networks

Prepared by

Patrick Donegan
Senior Analyst, *Heavy Reading*

www.heavyreading.com

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I Operator Outlooks On Backhaul Procurement

Every CTO has wrestled with the dilemma. When buying products or services, are operators best served by investing in a bundle of several products and services from one supplier? Or are they better served by cherry-picking best-of-breed options? In mobile networks, several models have proliferated. There are many examples where base stations, switches and transmission are all supplied by one turn-key supplier. There are also many examples of networks in which each network element, or each domain, is supplied by one or more best-of-breed vendors. And there are infinite shades of grey in which one vendor, typically the radio base station vendor, is the exclusive or primary supplier in more than one domain but doesn't enjoy sole turn-key supplier status.

In backhaul networks, Heavy Reading research evidence is that operators increasingly favor procuring their equipment directly from backhaul equipment vendors. As shown in Figure 1, in a December 2009 survey nearly three quarters of respondents in operators with mobile networks around the world stated that going forward they will procure their IP/Ethernet backhaul equipment directly. Just one in ten stated that they will rely on their radio base station vendors supplying it.

Figure 1: Operator Outlooks On Backhaul Equipment Procurement

"Going forward, what is your company's procurement process for selecting IP/Ethernet backhaul equipment likely to be?"

	NO OF RESPONDENTS	% OF ALL OPERATORS
We won't contract directly with IP/Ethernet backhaul equipment vendors. Our radio base station vendors should have sufficient IP/Ethernet competence for backhaul	5	7%
We won't contract directly with IP/Ethernet backhaul equipment vendors but we will compel our radio base station vendors to sub-contract to IP/Ethernet backhaul equipment vendors	2	3%
We will procure directly from IP/Ethernet backhaul equipment vendors	52	73%
Don't know/Not sure	12	17%
TOTAL	71	100%

*Source: Heavy Reading survey of 72 operators with mobile networks, December 2009 * See Appendix 6.2*

Heavy Reading doesn't have historical data to compare today's outlook with that of the past. But it's clear from long-standing familiarity with mobile networks that in the past an umbilical link between the selection of the radio base station vendor and the selection of backhaul network equipment provider was a lot more common. In this bundled model, the operator selected its radio base station vendor. As well as supplying radio base station equipment, the vendor also supplied backhaul equipment, be it in the form of TDM multiplexing equipment, microwave equipment, or other backhaul gear. Figure 1 therefore suggests that the tendency for operators to want to issue separate RFPs for radio base station and backhaul equipment has increased over time.

To understand why that is, it's worth considering the historical context. To begin with, backhaul and radio base station bundling has traditionally tended to be associated more with challenger operators, operators in emerging markets or operators at the very cutting edge of a new radio technology - and most particularly with operators that combined two or more of these characteristics. Most operators in mature markets, especially incumbents, always had, and still have, a stronger tendency to do their own thing in the two separate domains.

1.1 Base Station and Backhaul Bundling: The Historical Context

Bundling is a cost-saving proposition. In principle, the operator should get steeper vendor discounting across two product lines than across one. Benefits should also arise from close feature alignment and operational simplicity across the vendor's base stations and backhaul equipment. The operator's own resources and expertise for conducting RFPs may also be much less than those of its big radio base station suppliers. In the past, and sometimes still today, aggressive vendor financing has also made the supply of other network domains a condition of the supply of the radio base station network. Such incentives have always been tempting - and still are today.

It's worth noting that the operator that chooses this path doesn't necessarily become just a dumb channel for the radio base station vendor's own equipment. Often the radio base station vendor will select and deploy another vendor's backhaul products where it doesn't have an equivalent product in its own portfolio. In some cases (especially where its services arm leads the account engagement) the vendor will even select a competitor's backhaul product rather than its own in-house platform. There have been several instances of a turn-key radio base station vendor selecting a competitors' lower cost microwave equipment, for example. But despite all these incentives, Figure 2, shows that today operators in developing markets are just as committed to independent backhaul procurement as operators elsewhere.

Figure 2: Developing Market Operator Outlooks On Backhaul Equipment Procurement

"Going forward, what is your company's procurement process for selecting IP/Ethernet backhaul equipment likely to be?"

	NO OF RESPONDENTS	% OF ALL OPERATORS
We won't contract directly with IP/Ethernet backhaul equipment vendors. Our radio base station vendors should have sufficient IP/Ethernet competence for backhaul	4	10%
We won't contract directly with IP/Ethernet backhaul equipment vendors but we will compel our radio base station vendors to sub-contract to IP/Ethernet backhaul equipment vendors	0	0%
We will procure directly from IP/Ethernet backhaul equipment vendors	32	80%
Don't know/Not sure	4	10%
TOTAL	40	100%

*Source: Heavy Reading survey of 40 mobile operators in developing markets, December 2009 * See Appendix 6.2*

II. The Drivers Behind Independent Backhaul

There are a number of different business and technology related issues that explain the drive to procuring backhaul equipment independently. These are outlined below.

2.1 The Rise Of Regional And Global Multinational Operators

The last few years have seen mature international mobile operators like Vodafone and Orange add additional affiliate mobile operators to their portfolios. Other formerly domestically-oriented operators like NTT DoCoMo, SK Telekom, and Bharti Airtel have begun acquiring stakes in operators in other countries or acquiring them outright. And holding companies such as America Movil, Zain and Orascom has become major regional cellular players in just a few years by either seeding local networks in individual markets or acquiring them, or a combination of both.

These developments have brought a great many more mobile operators around the world under the umbrella of larger organizations with much greater commercial, financial and technology resources. Being part of these organizations has freed up affiliate CTOs to pay less attention to the short term costs savings associated with bundling of infrastructure elements. In some cases they are even required to align with group-level technology purchasing guidelines which mandate purchasing by network domain now. And even where the local operator still opts to outsource much or all of its network to a vendor partner, affiliation to the larger parent still strengthens the operator's hand in negotiating not just how vendor contracts will be awarded but also who to.

2.2 Backhaul Has Become More Strategically Important – And More Complex

In the days of 2G and the early days of 3G, backhaul was easily the least sophisticated part of the mobile network. Between the network elements, the standards bodies, 3GPP and 3GPP2, mandated plain old TDM transport, a straightforward and mature technology that was well understood by operators everywhere. With the network carrying mostly voice and some text messaging, capacity planning was relatively straightforward. Most cell sites could make do with a couple of DS1s or E1s and capacity requirements could be anticipated with a high degree of accuracy.

This legacy planning environment is changing. Throughout the world, the large scale adoption of EV-DO, HSPA and WiMAX devices is changing the traffic mix in the mobile network. There is now more data running over all the world's cellular networks than there is voice. And in the case of advanced mobile broadband operators, data traffic is increasing at a rate of two to five times a year. To bring lower cost and greater flexibility to the operator's backhaul network, 3GPP and 3GPP2 have extended IP/Ethernet interfaces beyond the mobile data core elements and out towards the controllers and base stations. Initially these new packet interfaces were optional in the standards but going forward into LTE they are mandatory.

There are many aspects of the network transformation underway which impact the operator's thinking about how the new backhaul network needs to be delivered. And these point to a need to be more discriminating about vendor selection. Because data traffic is inherently more bursty than voice, and because smart-phones in particular are more "chatty" in terms of the signaling traffic they generate, the risk of a network planner falling out of step with the new cellular traffic patterns is much greater than it was. And although 3GPP and 3GPP2 have defined IP/Ethernet interfaces throughout the backhaul elements they nevertheless offer little guidance on how to design, specify and implement the new network. In days gone by, all that was required was to nail up as many DS1/E1s or OC-3/STM-1 links as were necessary to meet demand. Going forward, a rich tapestry of finely balanced decisions needs to be made. Among these decisions are those that relate to how long TDM should be kept in place while lower cost IP/Ethernet backhaul is introduced. And which specific L2 or L3 protocol – VLAN, VPLS, MPLS-TP, IP/MPLS or another– is optimal for each of the different access and aggregation parts of the backhaul.

These decisions are finely balanced. Implementing them in the context of largely TDM-oriented legacy planning and operations processes introduces transformational challenges to the operator's backhaul operations teams which are often unprecedented in their scale and scope. Critically, whereas the scope for differentiation between vendors in TDM equipment is relatively limited, the scope for vendor differentiation in their understanding and support of IP/Ethernet protocols in the new backhaul network is greater. Strong competence in IP/Ethernet protocols at both the product and network design levels are therefore key in backhaul vendor selections.

2.3 Retaining The Option Of Deploying Multiple Radio Base Station Vendors

The cross-domain feature alignment and operational simplicity arguments for allowing the radio base station vendor to select the backhaul equipment gets weaker with every new generation of radio technology. This is because with each new generation of 2G, 3G or 4G standard, the radio base station vendor's feature alignment with the backhaul breaks down unless the operator sticks

with the self-same vendor. And that means passing up an opportunity to select a new radio base station vendor in the part of the network where the operator incurs the majority of its mobile infrastructure capex. Once the operator has more than one radio base station vendor at the same cell site, the cross domain feature alignment and operational simplicity arguments are all but broken.

Figure 3 shows that across different types of mobile operator, barely one in ten respondents disagrees that a "radio-agnostic backhaul" is a valuable proposition. Almost one in two adds an important qualifier, though, that whilst it is a valuable objective "in practice it's not that straightforward". In light of the operator outlooks on independent backhaul procurement depicted in Figures 1 and 2, this shouldn't be seen as recognizing a need to deploy the radio base station vendor's favored backhaul equipment. Rather it suggests a more basic appreciation of the need to assure that the radio base stations and the backhaul equipment both align to support the transport features that the operator requires. Consistent with the often stronger tradition of radio base station and backhaul bundling in developing markets, Figure 3 also suggests that 15% fewer respondents in developing markets are unwilling to compromise on the objective of a "radio-agnostic backhaul" than in developed markets.

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Figure 3: Operator Outlooks On A "Radio-Agnostic" Backhaul

"Does your company recognize the value of a backhaul network that is "agnostic" with respect to the type and simultaneous mix of 2G, 3G, or 4G radio technology or to the specific radio equipment vendor?"

	ALL OPERATORS	DEVELOPED MARKET OPERATORS	DEVELOPING MARKET OPERATORS
Yes, the backhaul network must be agnostic as regards the particular radios.	34%	42%	27%
Yes, ideally, the backhaul network should be agnostic as regards the particular radios but in practice it's not that straight forward	48%	45%	50%
No. It's not important whether the backhaul transport network is agnostic as regards the particular radios.	4%	7%	3%
No. a radio agnostic backhaul makes no sense– the backhaul requirements are inevitably driven by the capabilities of the specific radios.	7%	7%	8%
Don't know/Not sure	7%	0%	12%
TOTAL	100%	100%	100%

*Source: Heavy Reading survey of 72 operators with mobile networks, December 2009 * See Appendix 6.2*

2.4 Fixed Mobile Convergence

As operators build out high capacity IP or Carrier Ethernet access networks, many recognize the opportunity to leverage the same network for connecting cell sites as part of a new backhaul deployment as well as for connecting wireline enterprise and high end consumer clients. Integrated incumbent operators are particularly focused on this opportunity. And where this opportunity presents itself, it makes little sense for the operator to select a vendor exclusively on the basis of the mobile backhaul requirements, still less outsource that selection to a third party which only has the backhaul application in mind.

III Conclusions

As stated, there is no one-size fits all in backhaul procurement. Bundling continues to offer value for money for many operators. But the trends are clear. Operators recognize the value of a backhaul network that is independent of the radio base station vendor and want to direct vendor selection in this strategically important space. Operators in developed markets are making a reality of this 'unbundling' but operators in developing markets are looking to follow their lead.

VI. Background to This Paper

6.1 About the Author

Patrick Donegan – Senior Analyst, Wireless, *Heavy Reading*

Donegan has been a telecom market journalist, analyst, and strategist for 20 years. He joined *Heavy Reading* from Nortel, having spent five years as a senior manager of strategic planning for that company's wireless business – spanning GSM, CDMA, UMTS, WiMax, and other wireless technologies. Prior to Nortel, he spent two years in business research for Motorola's Corporate Strategy Office in EMEA and two years as a wireless analyst for the Yankee Group. At *Heavy Reading*, Donegan has focused on next-generation mobile network issues. Donegan is based in the U.K. and can be reached at donegan@heavyreading.com.

6.2 Original Research

This Heavy Reading White Paper was commissioned by Cisco, but is based on independent research. The research and opinions expressed in the report are those of Heavy Reading. Heavy Reading's annual mobile backhaul survey referenced in this White Paper was carried out in December 2009. 72 qualified respondents in operators with mobile networks responded. Of these 40 were from developing markets (Central & Eastern Europe, Africa, Middle East, Asia Pacific, North and South America) and 32 were from developed markets (North America and Western Europe).

6.3 About Heavy Reading

Heavy Reading (www.heavyreading.com), a unit of *Light Reading* (www.lightreading.com), is an independent market research organization offering quantitative analysis of telecom technology to service providers, vendors, and investors. Its mandate is to provide the comprehensive competitive analysis needed today for the deployment of profitable networks based on next-generation hardware and software.

Heavy Reading
32 Avenue of the Americas
New York, NY 10013
United States of America
Telephone: +1 212-925-0020
www.heavyreading.com
www.lightreading.com