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Support for device management in mobile handsets: 2008–2010 (3Q08 update)

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Executive summary

About this study

This study is the fifth iteration of a series of quarterly studies, covering 3Q08 onwards. It updates the findings of Ovum's previous quarterly study on 4Q07, which was published in July 2008.

Growing support for mobile device management (MDM) technologies in mobile handsets promises to give the mobile service provider a much increased degree of control over the device fleet. Key applications of MDM include remote configuration, defect fixing, diagnostics and software management.

However, as with most new handset technologies, tracking actual penetration of the key technologies within mobile handsets is a highly complex task. Even where data is available, it is not updated regularly enough to capture potentially significant short-term market changes.

This makes life difficult for mobile service providers, who need an up-to-date picture of penetration in order to decide whether and when they should be scaling up the use of MDM in their businesses. For vendors in the mobile device management space, an accurate picture of handset support will help them to build the business case when selling and marketing their solutions to customers. Handset manufacturers need to understand how they compare to the competition when it comes to support for these key enabling technologies.

This report therefore gives a detailed insight into the current penetration of MDM technologies in mobile handsets, and gives Ovum's predictions for future market development. In particular, we track support for three key technologies:

- OMA client provisioning (OMA CP)
- OMA device management (OMA DM)
- Firmware over-the-air (FOTA) update.

This study is based on exclusive primary data representing over 1,300 handsets launched worldwide since 2003. It therefore provides a well-evidenced picture of the market as it really is.

Key messages for this quarter

- This quarter shows incremental growth for all MDM technologies in handsets.
- Our estimates show that 116 million handsets shipped in 3Q08 that supported FOTA (up 7% from 107 million in 2Q08); 197 million handsets shipped in 3Q08 that supported OMA CP (up 3% from 192 million in 2Q08); and 101 million handsets shipped in 3Q08 that supported OMA DM (up 1% from 99 million in 2Q08).
- Year-on-year FOTA shipments are up by 2%, OMA DM by 13% and OMA CP by 43%.
- These figures are down in respect to Ovum's forecast for the period. With hindsight, Ovum's forecast was overly aggressive, and for this reason the current forecast has been adjusted to accommodate a more modest adoption rate.
- The previous forecast also did not consider the downturn in the handset market which has, in Ovum's view, impacted the MDM adoption rate for the first three quarters of 2008.
- In the FOTA market, Red Bend continues to dominate, with 60% of the FOTA shipments in 3Q08. This growth has been, mainly, at the expense of HP.

Definitions

OMA client provisioning (OMA CP)

OMA CP 1.1 was the first device management technology that the Open Mobile Alliance standardised; although first published in 2002, it was not finalised until 2005. It was designed to be an industry-standard alternative to the various proprietary protocols then in use, which included Nokia-Ericsson Smart Messaging and Openwave Primary Provisioning. OMA CP extends the client provisioning functionality included in WAP 2.0 ('WAP provisioning'), so is meant for use with WAP-enabled devices.

'Client provisioning' is the process of remotely readying a mobile device for active service, primarily by configuring communications settings, with minimum user interaction. OMA CP provides for the two basic phases of client provisioning: bootstrapping (establishing a trusted connection between client and server for the first time) and continuous provisioning. OMA CP supports provisioning either over-the-air or via a SIM card. Primary communications settings can be configured, as well as, optionally, application settings such as multimedia messaging, email, streaming and so on.

OMA CP is very much a first-generation device management technology, in that it only allows for one-way communication. Bootstrap requests and settings are pushed out from client to server without any way of interrogating the device to find out what the local status is. This rules out its use in many of the advanced device

management applications now being implemented by service providers, such as FOTA and diagnostics.

OMA CP is not transport-independent; it uses WAP Push for delivery to mobile devices, either over-the-air or via a SIM card. It is bearer-independent, but in practice has not been used outside the GSM world due to the delayed and patchy implementation of WAP in CDMA networks. The CDMA world has used its own client provisioning protocols (in particular IOTA, which started life as an Openwave technology but is now the responsibility of the 3GPP2). This is now changing, as the global cellular community converges around OMA DM for device management.

OMA DM is the recognised successor to OMA CP. As a result, the Open Mobile Alliance has agreed that most new development on OMA CP will now cease.

OMA device management (OMA DM)

OMA DM was inherited by the Open Mobile Alliance from the SyncML Initiative, which first published its work on SyncML-based device management in 2002. The SyncML Initiative was absorbed into the OMA, which released its first approved version of OMA DM (version 1.1.2) in early 2004 and the latest version, 1.2, in early 2007. SyncML DM is therefore synonymous with OMA DM versions 1.1 and below.

OMA DM represents the second generation of device management technology, bringing not only a truly global standard but also the crucial two-way communication stream that its predecessor lacked. OMA DM is also extremely versatile and extensible, which increases its appeal to OEMs who wish to differentiate themselves — a real achievement for an industry standard operating in such a strategic domain.

Two key aspects of the OMA DM architecture which provide for this extensibility are management objects and the management tree.

Almost any aspect of a mobile handset can be defined as an OMA DM object, so long as its boundaries can be clearly identified, and it is amenable to being updated dynamically (i.e., added, edited or removed remotely). Objects could include user applications, middleware components, service settings or the firmware image. There are some mandatory objects in the specification, and the OMA is in the process of defining further optional objects. These include FUMO (for Firmware Update Management Object, which is described below), SCOMO (software component object, for software management) and DIAGMON (for diagnostics).

The OMA DM management tree is a hierarchy-based framework that enables an OMA DM-compliant server to recognise which management objects a particular connected device supports, enabling the server to treat the handset according to its precise capabilities. The beauty of this idea is that OEMs can define their own objects if they have specialist requirements. As long as they provide the requisite technical information to OMA DM server vendors, there should be little negative impact on interoperability.

OMA DM is explicitly bearer-independent and also (unlike OMA CP) transport-independent, so can be used in a very wide variety of communications scenarios: for example HTTP, WSP and OBEX, over all flavours of cellular mobile, Bluetooth, PC cable, Wi-Fi and so on. It has accordingly met with wide acceptance and is being implemented in every region, including by CDMA operators and in Japan. Formal collaboration between the 3GPP2 and the OMA has resulted in recommended practices to aid interoperability between OMA DM and IOTA.

Firmware over-the-air update (FOTA)

FOTA update enables a management authority, such as a mobile service provider, to remotely update files stored in the firmware of a mobile handset, including over the cellular network. This is as opposed to cabled firmware update via a PC or other terminal, which has been in existence for many years.

Some early or basic implementations allowed the updating of certain restricted areas of the firmware only. Today, most FOTA implementations update the entire firmware image of a handset, enabling (primarily system) files to be upgraded. In recent years this process has been made easier and quicker by the use of delta files, which minimises the amount of data sent over the air by sending packages that only contain the changes, rather than the new firmware image in its entirety. Newer FOTA technology coming to market now enables the management of particular components, by dividing the firmware image into modular blocks associated with particular applications, which can then be updated separately. In addition, firmware updating can now be performed in the background, giving the consumer full use of the phone during the update process. This is particularly important for ensuring access to emergency services.

Initial FOTA implementations used proprietary protocols to communicate between the FOTA client on the handset and the FOTA server in the network. However, these protocols are now being replaced by OMA DM, via FUMO (the Firmware Update Management Object), which was approved in February 2007. This does not mean that OMA DM or FUMO are the same as FOTA, nor that FOTA is being displaced — there will still be a need for proprietary FOTA technology in both client and server.

For the purposes of this study, we count all of the above FOTA functionality, basic or advanced, whether it uses OMA DM or proprietary protocols for the transport. However, we only count handsets where we believe that the FOTA functionality is available for service providers to use. In some cases, this may require service providers to turn on FOTA remotely.

Shipments and installed base

'Shipments' means the number of handsets that have shipped to end users during the given period. 'Installed base' means the number of handsets that have shipped to end users and are still in active use on a cellular network, given as of the end of the period.

Whereas quarterly shipments show us what is happening with new devices, installed base is a good way to assess the status of a service provider's actual subscriber base, which will of course contain a large number of older devices.

Results of the study

Current penetration of device management technologies

Table 1 shows the current penetration of the technologies, as of 3Q08.

Table 1 **Global penetration of MDM functionality in handsets, 3Q08**

	(000s)
FOTA	
Shipments (during the period)	115,960
Installed base (as of end of period)	712,029
% of global handset shipments	36%
OMA CP	
Shipments (during the period)	196,591
Installed base (as of end of period)	1,560,684
% of global handset shipments	60%
OMA DM	
Shipments (during the period)	100,767
Installed base (as of end of period)	741,079
% of global handset shipments	31%

Source: Ovum

Commentary on this quarter's results

The results from this quarter's study show incremental quarter-on-quarter growth from last quarter for shipments of all MDM technologies in handsets.

Our estimates show that:

- 116 million handsets shipped in 3Q08 supported FOTA (up 7% from 107 million in 2Q08)
- 197 million handsets shipped in 3Q08 supported OMA CP (up 3% from 192 million in 2Q08)
- 101 million handsets shipped in 3Q08 supported OMA DM (up 1% from 99 million in 2Q08)

The results also demonstrate year-on-year growth of each technology: FOTA shipments are up by 2%, OMA DM by 13% and OMA CP by 43%.

These figures are down in respect to Ovum's forecast for the period. With hindsight, Ovum's forecast was overly aggressive, and for this reason the current forecast has been adjusted to accommodate a more modest adoption rate.

The previous forecast also did not consider the downturn in the handset market which has, in Ovum's view, impacted the MDM adoption rate for the first three quarters of 2008.

Regional differences

The above figures are global, so they represent an amalgam of the situation in each region and segment of the cellular market. This means that they hide some quite significant differences. Looking at handset support for MDM in different regions, it is clear that the differences are largely driven by two factors:

- The prevalence of a radio network technology in a particular area. For example, last quarter we commented on the apparent lack of OMA CP support outside the GSM world due to the specification's dependence on WAP.
- Overall mobile handset availability in the region. If OEMs have smaller portfolios in a given region, then the absolute number of MDM-supporting models available in that region will be lower, and therefore operators looking to launch advanced MDM services will have fewer choices when it comes to handsets.

Europe and the US have been well supported over the last two years in terms of high availability of advanced MDM-supporting handsets. Over the last year the MEA (Middle East and Africa) region has been in catch-up mode. Support for FOTA is considerably higher in Japan than in any other region, due to early implementation and the strong buying power wielded by Japanese operators. This is pulling OMA DM support along in its wake, as Japanese operators transition to FUMO. We understand that the top three major Japanese operators are in the process of migrating to OMA DM.

Support for FOTA and OMA DM is generally higher in handsets supporting third-generation cellular network technologies. This difference seems particularly apparent when comparing second- and third-generation CDMA handsets, with CDMA2000 handsets showing significantly higher support for both technologies.

Transparency of support for MDM is poor

However, there is an ongoing problem regarding transparency of support for advanced MDM in the more developed markets. In other words, it is not possible to guarantee that the phone in a given subscriber's hand supports these technologies, even if we know that the OEM has implemented the technology for that model. This is because:

- some OEMs (LG, for example) implement the technology upon operator request, but it is not widely in vanilla handsets
- some operators ask OEMs to remove technologies from handsets to be used on their networks, for their own security or strategic reasons.

This situation is made more difficult by OEMs claiming to support MDM technologies to ensure that a handset is ranged within a mobile operator's handset portfolio, whereas in reality the handset lacks the basic support that is required (e.g., OMA DM).

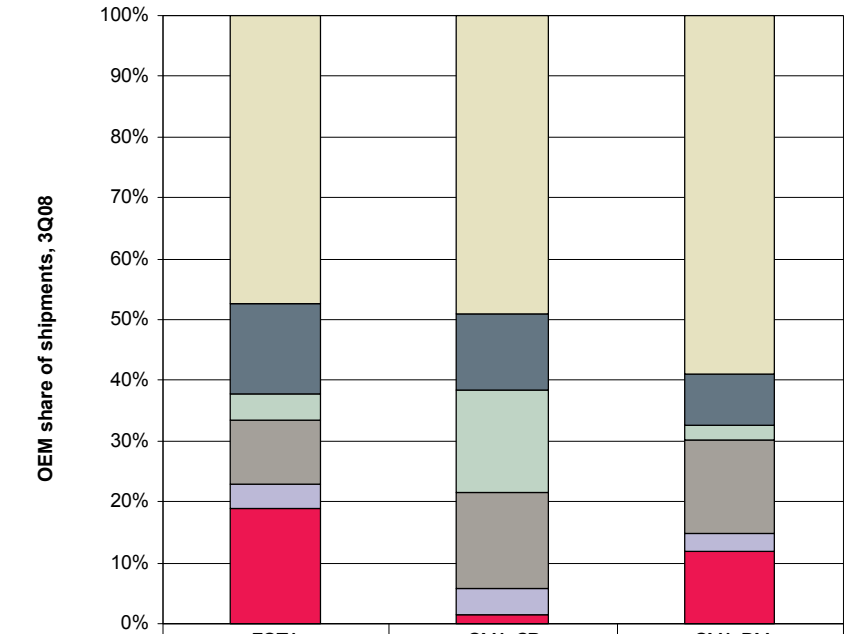
In addition to this, there is an ongoing lack of public information on support for OMA CP, which we commented on last quarter.

We believe that this lack of transparency is a thoroughly bad thing when it comes to adoption of MDM services, making it much harder for operators to assess the readiness and capabilities of their own device fleets. Plus, having OEMs treat every operator differently adds to the overall cost of implementing MDM in handsets, and may lead to more differences in implementation of the standards than are necessary.

Comparisons by handset manufacturer

Figure 1 shows the share of each major handset manufacturer in global shipments of the three technologies.

Figure 1 **OEM share of MDM shipments, 3Q08**

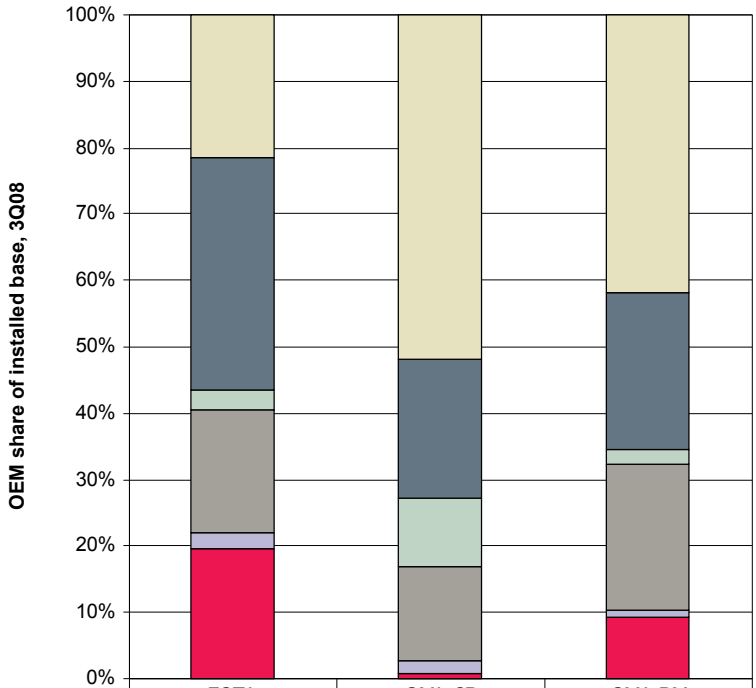


	FOTA	OMA CP	OMA DM
Nokia	47.2%	49.0%	59.0%
Motorola	14.9%	12.7%	8.5%
Samsung	4.3%	16.9%	2.2%
Sony-Ericsson	10.7%	15.5%	15.5%
LG	3.9%	4.5%	3.0%
Others	18.9%	1.4%	11.8%

Source: Ovum

Figure 2 shows the same but for the global installed base of the MDM technologies.

Figure 2 **OEM share of MDM installed base, 3Q08**



	FOTA	OMA CP	OMA DM
Nokia	21.6%	52.0%	41.8%
Motorola	35.1%	20.7%	23.6%
Samsung	2.9%	10.4%	2.2%
Sony-Ericsson	18.6%	14.3%	21.9%
LG	2.2%	1.7%	1.2%
Others	19.7%	0.9%	9.2%

Source: Ovum

This quarter's results continue to reflect the rise and fall of vendors in the broader market. Nokia continues to dominate in terms of handset volumes and market share and also of its support for MDM. In fact, as other advocates are declining, its influence becomes proportionally greater.

Nokia's share of MDM shipments for FOTA is 47% (up from 45% last quarter), its share for OMA DM is 59% (up from 55% last quarter) and shipments for OMA CP is 49% (up from 48% last quarter). Unlike other vendors, Nokia has continued to strongly push MDM in its portfolio through 2008 and this commitment together with its huge shipment volumes has continued to fuel the MDM handset market.

Motorola has previously been a strong MDM advocate and it played an important role establishing MDM handsets in the market during 2006 and 2007. However, its continued decline has impacted the MDM market. Originally Ovum didn't expect its

decline to unduly impact the penetration of MDM technologies, with operators ranging equivalently specified devices to fill the gap left by Motorola but the reality has been that Samsung, who has been the main beneficiary of Motorola's decline, has not been adopting MDM within as many of its handsets.

Motorola's shipment's for all three technologies is down, again this quarter. Its share of shipments for FOTA, OMA CP and OMA DM have dropped by 1%, 4% and 2%, respectively, over this quarter; this makes a year-on-year percentage point drop of 11% for FOTA, 4% for OMA CP and 8% for OMA DM. However, the reasons for the decline are unchanged from last quarter. Motorola's devices business is still suffering from a period of uncertainty and instability.

Samsung's and LG's share of shipments are both up this quarter, but not by a significant percentage. Both companies are still behind their competitors in support of MDM but the penetration in their portfolios is increasing. As Ovum commented in the previous quarter, the extent of the lack of support seems inconsistent with the overall market, particularly with support for OMA CP and OMA DM. An explanation of the seemingly low penetration is a lack of global publicly available information on MDM support within handsets, particularly for LG. LG and Samsung both add support for MDM upon the request of operators, which may not be part of the initial handset specification. This practice leads to inconsistent information, as the information available from the vendors can be out of step with the handsets that are actually available through the operators.

Sony-Ericsson's share of MDM shipments is slightly down again this quarter, and its share of shipments has declined year-on-year by a significant percentage. Sales for Sony-Ericsson were down over the first three quarters of 2008 compared to 2007. During this period, Sony-Ericsson has undergone a significant restructure and changed its strategic direction. The company is shifting its emphasis towards higher-end handsets and it is likely that more of its overall volume will support MDM; however, Sony-Ericsson is focusing on profitability, not volume, during 2009, so this will impact the numbers in the next four quarters, especially if it loses more market share to LG.

FOTA vendors

Three vendors are currently the main providers of the FOTA client technology, which is embedded in mobile handsets by manufacturers:

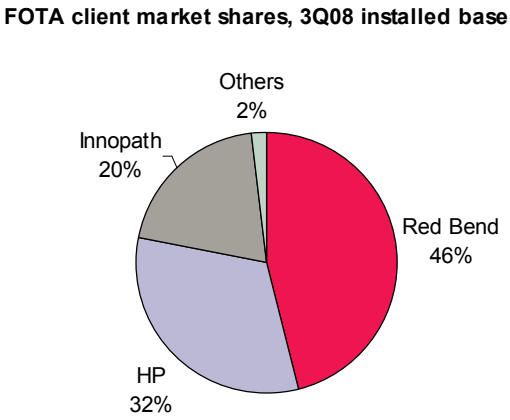
- Red Bend Software
- InnoPath
- HP (previously Bitfone, which was bought by HP in February 2007).

In addition to this, some manufacturers have built their own FOTA technology. We believe Samsung has done so; Microsoft also has been using its own FOTA/OMA DM technology in Windows Mobile, versions 5 and 6. However, Microsoft supports OMA DM in the latest version of Windows Mobile, version 6.1, which was launched in 2Q08.

The market for FOTA client technology is evolving; our research shows that most manufacturers have worked with more than one vendor. In the Japanese and CDMA markets this is inevitable: here, FOTA implementations by service providers are closely tied to specific mobile handsets, meaning that manufacturers are often required to implement a particular vendor's technology. But even in devices meant for the open market, manufacturers frequently experiment. For example, Motorola now awards a growing proportion of its FOTA work to Red Bend, having worked exclusively with HP during the preceding years.

Figure 3 gives a market share analysis for installed base of FOTA clients, as of the end of 3Q08.

Figure 3 **FOTA client market shares, 3Q08 installed base**

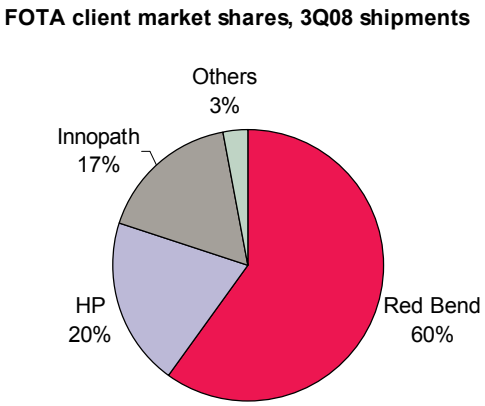


Source: Ovum

Red Bend has continued to increase its market share mainly at the expense of HP. Red Bend increased its market share throughout 2007 and has continued through the first three quarters of 2008. Red Bend's FOTA client is now used by four out of the top five handset vendors as well as with a number of vendors in Japan. Nokia's continued momentum for deploying FOTA in its handsets has also helped the company.

This can be seen even more clearly in *Figure 4*, which gives the same for shipments of FOTA clients on mobile handsets in 3Q08.

Figure 4 **FOTA client market shares, 3Q08 shipments**



Source: Ovum

As with last quarter, the relative positioning between the main three FOTA vendors has largely stayed the same. However, HP's position is becoming substantially threatened by Red Bend's growth.

Forecast: 2008–2010

Market development scenario

Table 2 sets out the key assumptions that Ovum has made about the future development of the MDM market, as they relate to our forecast.

Table 2 **Market development scenario: 2007–2009**

Market development factor	Likely result
The majority of device management transactions in GSM markets are taking place via OMA CP, and transaction volumes are still growing as basic MDM solutions are implemented in developing markets. Pressure from GSM service providers in all geographies will ensure OEMs implement support for OMA CP in the few remaining non-supporting GSM handsets. However, non-GSM service providers are moving straight from other protocols to OMA DM without implementing OMA CP.	Some short-term growth in OMA CP penetration, up to 100% in GSM markets only
Service providers in developed markets are implementing advanced MDM solutions. However, they are unwilling to pay for vendor-proprietary MDM clients to be embedded in handsets — as well as the additional cost, this model severely restricts the number of subscribers within reach of advanced MDM.	Increased demand for OEMs to support OMA DM, as a standards-based alternative to proprietary MDM client technologies
With no rival technology on the horizon, and strong demand from service providers in all markets, handset OEMs step up implementation of OMA DM, starting with high-end and mid-tier devices.	Strong growth in OMA DM penetration, towards an eventual ceiling of 100% across all markets and OEMs (beyond our forecast period)
Service providers in developed markets are implementing FOTA (as part of advanced MDM solutions) in response to growing problems with handset defects. There are fewer requests to disable FOTA in capable handsets. Although some handset OEMs are already implementing FOTA aggressively, others are lagging behind and service providers are now exerting pressure on them to step up their efforts.	Strong growth in FOTA penetration, towards an eventual ceiling of 100% across all markets and OEMs (beyond our forecast period)

Source: Ovum

Ovum's forecasts

The figures for FOTA and DM for this quarter and for 1Q08 and 2Q08 are significantly down since Ovum's last forecast for the period. FOTA shipments were down by 41% and DM down by 33%.

Following the rapid growth for all MDM technologies during 2007, our forecast predicted the momentum to continue into 2008. In reality the momentum did not continue as we estimated. We forecast that shipments will have incrementally increased in 4Q08, so penetration rates in 2008 will be broadly comparable to those of 2007 for FOTA and DM technologies.

Despite the plateau in 2008, Ovum still expects adoption to continue for MDM technologies through to 2010. Service providers and now vendors (such as Nokia,

Microsoft and Google) continue to roll out device management services and this momentum will continue to drive support for FOTA, OMA DM and OMA CP.

The increasing adoption of FOTA will continue to drive the uptake of OMA DM as the FOTA market moves away from the use of proprietary protocols and towards OMA DM/FUMO.

Although there is no particular reason why penetration of OMA DM and FOTA should not eventually reach 100%, there will be non-supporting devices still in existence for some time after 2009. These will be found in those parts of the market where demand from service providers for advanced device management is not as acute, such as:

- in low-cost markets where advanced data services are not as important, making the business case for remote device management solutions less attractive
- for some fashion phones, which are designed for aesthetics and a very fast turnover rather than sophisticated functionality.

Table 3 gives Ovum's full forecasts, both quarterly and annual, for the same period.

Table 3 **Forecasts for MDM technologies on mobile handsets**

(000s)	3Q08	4Q08	1Q09	CY07	CY08	CY09	CY10
FOTA							
Shipments during the period	115,960	152,665	124,958	408,700	479,907	574,591	858,858
Installed base as of end of period	712,029	798,722	868,217	682,628	982,629	1,379,238	1,459,777
% of overall shipments	36%	41%	40%	36%	37%	41%	58%
% of installed base	-	-	-	21%	27%	34%	34%
OMA CP							
Shipments during the period	196,591	229,100	210,555	527,226	784,034	981,562	1,095,823
Installed base as of end of period	1,560,684	1,781,771	1,981,454	1,037,404	1,781,771	2,664,660	3,456,576
% of overall shipments	60%	62%	67%	46%	61%	71%	75%
% of installed base	-	-	-	32%	49%	66%	80%
OMA DM							
Shipments during the period	100,767	120,611	111,203	292,841	420,227	516,851	605,504
Installed base as of end of period	741,079	859,760	967,630	451,633	859,760	1,344,238	1,838,091
% of overall shipments	31%	33%	35%	26%	32%	37%	41%
% of installed base	-	-	-	14%	23%	33%	42%

Source: Ovum

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Methodology

Historic and actual data, up to 3Q08

The primary input to this study is a comprehensive survey of mobile handsets launched over the past four years, feeding into a repository of nearly 1,300 handsets from all major manufacturers and listing their key characteristics, including support for FOTA, OMA CP and OMA DM, plus their date of launch and regional availability. This data is gathered from primary and secondary sources, including:

- manufacturer websites
- third-party websites (for example, MDM vendors, industry associations, resellers)
- standards bodies (particularly the Open Mobile Alliance)
- device manufacturers and FOTA vendors.

In order to create an estimate for how many FOTA, OMA CP and OMA DM-supporting handsets have shipped to date, we create a model to estimate shipments of each model as follows:

- Using the data in the handset repository, we estimate what proportion of each major manufacturer's portfolio was FOTA-, OMA CP- and OMA DM-enabled each quarter between 2Q03 and 3Q08.
- Using the data on regional availability in the repository, we give each handset a 'regional weighting' to reflect the fact that some handset models are distributed much more widely than others.
- We then use these two factors along with vendor market share data to estimate how many of those devices were shipped every quarter for the same period.

Note that the last step in the process has a tendency to over-estimate the number of handsets that were actually shipped. This is because only a few handsets are available on a truly global basis; in particular, many FOTA-supporting handsets are only shipped into certain carriers. The regional weighting stage deliberately compensates for this tendency.

In order to derive market shares for FOTA vendors, we use primary data supplied by the vendors to identify which individual handset models each one was responsible for. This data is tracked throughout the above process to produce FOTA vendor market shares.

The final results produced by the model are cross-referenced with data points supplied by industry sources, and the assumptions driving the model are refined where necessary in order to produce more accurate outputs. In particular, we cross-reference with royalty data from FOTA vendors.

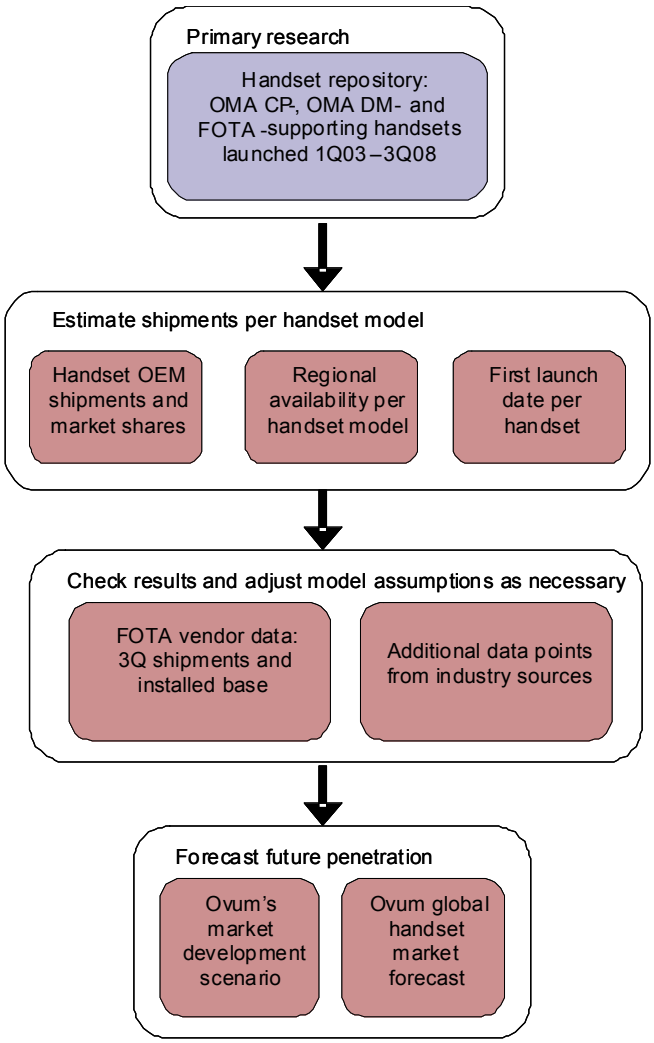
Forecast: 2008–2010

Our forecast uses exactly the same methodology as above, except that we use predicted rather than actual data on new launches of FOTA-, OMA CP- and OMA DM-enabled handsets.

We forecast new launches by extending the historic pattern of model launches per each individual manufacturer, informed by the assumptions embedded in our market development scenario as above. Each quarter we review our predictions from last quarter, changing our assumptions for future quarters if necessary.

Figure 5 illustrates the different stages of the methodology.

Figure 5 **Methodology: device management support in mobile handsets**



Source: Ovum

Key assumptions of the model

The methodology aims to keep complexity to a minimum by keeping certain factors static over the forecast period. We revisit these factors every quarter to ensure that they are still valid.

The key assumption encapsulated within the model is therefore that, over the forecast period, there is no significant change to:

- manufacturer market shares
- the regional distribution of shipments
- relationships between manufacturers and FOTA vendors
- the size of manufacturer portfolios (with the exception of BenQ-Siemens, to reflect the company's portfolio running down in the period before the company effectively ceased operating)
- portfolio refresh rates
- manufacturer strategies regarding smartphones.

We also assume that:

- on average, a given handset model remains available for end users to buy for two years after launch
- once shipped, a handset stays in the installed base for an average of four years.

Critique of the methodology

As actual shipment data for individual handset models was not available for this study, this key variable had to be derived using assumption-based modelling. Although we are satisfied that our methodology is robust, using modelling rather than actual data always introduces the possibility of error.

Although the handset database which drives the model is comprehensive, it is bound to contain gaps and errors and there can be no guarantee that these gaps will not create systemic bias in the results. In particular, data availability for OMA CP was poor and had to be augmented by (evidence-based) assumptions.

All three major FOTA vendors (Red Bend, HP and InnoPath) kindly provided data on the penetration of their own technologies. Although Ovum always critiques, double-checks and sometimes edits such data to ensure it is comparable, we must assume that the data provided by vendors is accurate and we treat every vendor equally in this regard.

It is generally difficult to get an accurate picture of manufacturer portfolio sizes and refresh rates, mainly due to substantial regional variation and the lack of clarity as to what constitutes a unique model. This creates a certain amount of short-term elasticity in the outputs, although long-term trends are mainly unaffected.