



SES White Paper September 2017

TRANSFORMING VIDEO SERVICES

How SES's differentiated solutions are empowering customers

Cutting through the complexity of today's video distribution chain is challenging, which is why SES has invested in a suite of capabilities to deliver high-quality video anywhere, anytime, and on any screen. SES has built on decades of experience delivering video to audiences all over the world and created a full suite of services that provide end-to-end solutions for every video distribution platform. Encompassing DTH, Cable, IPTV, Video on Demand (VOD), and over-the-top (OTT) distribution, this powerful package is bound together by the defining elements of SES service – high-quality, reliability, innovation and

customer care. Brought together these assets fully enable content monetisation for SES customers, and shape the end-user experience.

SES is at the forefront in broadcasting and video technology, capitalising on the power of satellite to deliver high-quality video to DTH antennas, as well as cable and IPTV headends anywhere. SES satellites cover 99% of the globe, and carry content to 325 million homes and over one billion people. SES was the first satellite operator to broadcast a commercial Ultra High Definition (Ultra HD) channel, and broadcasts the largest share of High Definition (HD) channels of any satellite operator.

Distributing a piece of content on linear channels simultaneously with on-demand platforms requires multifaceted capabilities within the same organization. That is why SES is

managing this complexity by offering complete content management services through its subsidiary MX1. MX1 has the full capabilities to ensure that every aspect of delivering a piece of content to broadcast or online platforms is managed smoothly, enabling broadcasters, media companies and media right holders to offer end-user content whenever, wherever, and on any device they want.

Beyond services and technology, SES continues to build on its rich history of creating media ecosystems. By working with customers and partners, SES is developing new media platforms to expand TV neighbourhoods, enter new markets and empower local content providers. These platforms are designed according to the customer's or partners' requirements and each represent a new future for video distribution that is both linear and on demand.

SES[▲]
beyond frontiers

BROADCASTING

SES has built its success on providing high-quality and innovative service for broadcasters across the globe, today serving 130 million satellite homes, 148 million cable homes, and 44 million IPTV homes.^{1,2} Satellite is the ideal infrastructure to deliver video content to multiple screens at the same time. A single satellite can deliver television broadcasts to an unlimited number of antennas within its widebeam, so as long as there is a satellite directed towards a region those antennas can pick up the signal. SES has over 50 satellites in Geostationary Earth Orbit (GEO), which means content owners, platforms, and viewers can benefit from the reliability and completely global coverage of the SES fleet. This is particularly important during live events such as any type of sport matches, Olympic games, and concerts. During these broadcasts image quality is key, but that is also true for all broadcasts, which is why SES has been consistently at the forefront of video innovation, supporting HD and then Ultra HD quality video formats.

HIGH DEFINITION VIDEO

Since the creation of the HD standard, SES has been a steward of the technology, co-creating the HD Ready label in 2005 that helped consumers prepare for the technology. SES now broadcasts 2,500 channels in HD quality across the world, and has continued to develop the reach of the technology, notably founding HD+, a media platform operated in Germany for HD and future UHD content. Customers consistently rate SES Video solutions as the most relevant compared to the competition.³

HD continues to grow in all markets, and SES is fostering this. Its investment in Latin America is a particularly good showcase for the potential of HD in today's media environment. The recent launch of SES-10 and its start of operations represents a very exciting new opportunity for broadcasters in Latin America. The replacement and additional capacity on SES-10 will be ideal to enable broadcasters to meet the growing demand for better picture quality in the Latin American market, where more than 80 Ultra HD channels are expected by 2025.⁴ SES-10 adds to a variety of investments SES has been making in the Latin American region, including the launch of the new video distribution neighbourhood with the NSS-806 satellite at 47.5 degrees west in 2014, which was paired with an antenna seeding programme. The antenna seeding programme offers 3.7 meter antennas and LNBs to cable and DTH operators in the region, with the goal to provide comprehensive reach to all cable head-ends from Mexico to Argentina. Combined

with SES's video services, these investments in the region will help local broadcasters bring the best user experience to their consumers with content delivery on multiple platforms.

ULTRA HD

SES has the largest share of HD channels of all satellite operators, and is using that experience to steward the introduction of Ultra HD. SES broadcast the world's first commercial Ultra HD channel, Fashion One 4K, launched in September 2015. Although it offers four times better picture quality, the delivery of Ultra HD represents a challenge for many broadcasters because it requires at least twice as much bandwidth compared with an HD channel, and this causes challenges with distribution. So SES is using its experience to make it possible for content providers across the globe to broadcast Ultra HD via satellite. This means that SES customers ensure that end consumers around the world can view the highest quality content, on their UHD TV sets, with 25% of households worldwide expected to own an Ultra HD TV by 2020.⁵

HD took four years to get to market, but SES wanted to break that mould for Ultra HD. Therefore it invested in accelerating the roll-out of Ultra HD in the United States, reshaping its technology by focusing on the entire end-to-end ecosystem. This turned into SES's US Ultra HD Platform, a scalable, fully-managed solution that has steadily attracted cable and IPTV providers. Through this initiative SES has amassed the largest Ultra HD multiplex with 10 channels delivered via satellite. These channels are received by over 20 cable and IPTV providers that

are currently testing and conducting consumer trials via the SES Ultra HD platform. Some of these providers have even launched their historic consumer Ultra HD services with the SES-delivered Ultra HD channels. Worldwide, SES now broadcasts over 30 Ultra HD channels, having turned Ultra HD into commercial reality within only two years.

LIVE EVENTS

When distributing a live sports match or any other event, image quality is paramount for the viewer, which is why satellite is the ideal infrastructure for such broadcasts. SES provides the reliability of service and flexibility needed for occasional use broadcasting, and is showcasing its innovative approach by increasingly broadcasting live events in HD. MX1 capabilities are added to this to provide a complete range of services for occasional use needs, for any sporting match or event.

For the 2016 Olympics in Rio SES had capacity booked on four satellites, enabling the transmission of the games to the Americas, Europe, Asia, and Africa. This demand exceeded any previous distribution for the Olympics, which SES has been providing capacity for since 2000. These Olympics also broke another milestone, broadcasting the games in Ultra HD on commercial channels for the first time. Satellite has played a key role in delivering the Olympics to viewers across the world since 1964, when satellite technology made it possible for the games in Tokyo to be broadcast in other parts of the world. Still today satellite plays a key role in broadcasting live events, as it consistently offers high-quality video distribution that is reliable.

1 SES Satellite Monitor, March 2017

2 SES reach includes subscribers reached via Ciel-2's spot beams and includes 1.1 million contribution to digital terrestrial networks (Ukraine) and 195 million to terrestrial networks (Middle East)

3 Circleresearch, February 2017

4 NSR, February 2017

5 Ovum TV Forecast, February 2016

Accelerating the roll-out of Ultra HD in North America

01 APRIL 2015
World's first Ultra HD solution for cable systems

WORLD 1ST

SES unveils first-ever end-to-end Ultra HD broadcast solution.

02 JUNE 2015
Breakthrough Ultra HD trial
 Armstrong begins testing camera-to-screen ecosystem, set to accelerate Ultra HD delivery to cable homes.

FIRST TRIAL

03 SEPTEMBER 2015
World's first global Ultra HD channel

1ST FASHION ONE 4K
+ NASA TV UHD IN NORTH AMERICA

Global launch of Fashion One 4K on SES satellites, plus NASA TV UHD in North America.

04 JANUARY 2016
SES launches its own Ultra HD channel
 Unveiling UHD-1, SES's fourth Ultra HD channel in North America.

UHD-1 IN NORTH AMERICA

05 JULY 2016
Cable operators begin first Ultra HD trials
 Multiple US cable operators begin testing delivery of Ultra HD content across the fully-managed platform.

TESTING DELIVERY

06 OCTOBER 2016
Three new channels join Ultra HD line-up

+3 UHD CHANNELS IN NORTH AMERICA

Nature Relaxation 4K, C4K360 and iNlight TV now available via three SES satellites over North America.

07 NOVEMBER 2016
Ultra HD trials expand
 Eight US cable operators test 4K content delivery on SES's Ultra HD platform.

8 US CABLE OPERATORS TESTING 4K DELIVERY

08 DECEMBER 2016
Nine channels now transmitting

9 UHD CHANNELS OVER NORTH AMERICA

Travelxp and 4KUniverse join Ultra HD neighbourhood, hosted on three SES satellites that serve nearly 100 million homes across North America.

09 FEBRUARY 2017
Over 15 TV operators
 Some of the first cable providers to participate are nearing historic launch of consumer Ultra HD packages.

>15 TV OPERATORS TESTING ULTRA HD PLATFORM

10 MARCH 2017
Verizon joins Ultra HD trials
 Ultra HD solution to drive the development of Ultra HD delivery for Verizon Fios subscribers nationwide

VERIZON & SES TRIAL ULTRA HD DELIVERY

11 APRIL 2017
Historic first linear consumer Ultra HD services
 US Pay-TV providers launch 1st commercial UHD package to cable and IPTV homes using SES's platform

HISTORIC LAUNCH

VIDEO SOLUTIONS

Changing consumer behaviours are shaping the video ecosystem, causing widespread and exciting transformations. SES has seized this opportunity, reimagining its video solutions through a unique combination of infrastructure, services, and solutions that cover the complete video value chain, from the content producer to the viewer, who is watching on any screen, anywhere, and at anytime. SES's customers are increasingly agnostic when it comes to their distribution platforms, and so SES has designed services that are equally agnostic. Regardless of how a customer's value chain ends, SES, MX1, and its partners can help them realise the full potential of their content.



CONTENT MANAGEMENT

MX1 provides fully managed playout and turnaround services, such as channel origination and management, content processing and delivery to TV service providers across the globe. Today over 2,750 TV channels are distributed by MX1, and by working with MX1, customers know that their content is delivered seamlessly, thanks to the high-quality of service that uses backups and redundancies to ensure the best viewer experience. Importantly, all MX1 customer facing services are available in the cloud, enabling a seamless user experience from anywhere. In addition to its technology offering, it is also this responsiveness and dedication to service that attracts customers to MX1.

Business continuity in particular is key to customers such as Sky Deutschland, who depend on MX1 for back-up services. Their

contract with MX1 ensures that, in case of any technical issues with Sky Deutschland's main signal, the broadcaster's programming will be restored from the MX1 Media Centre in Germany. To support these services, the MX1 Media Centre concurrently receives all necessary data and video transmission material from the Sky channels, which would allow MX1 to sustain Sky Deutschland's broadcasting operations and seamless service availability in case of critical issues in their main site. This particular service is based in Germany, but MX1 has the capacity to manage content from multiple sites across the globe, including London, the US and Tel Aviv.

CONTENT MONETISATION

MX1 goes beyond traditional playout services, offering a complete suite of next generation video services to deliver video to VOD and OTT platforms through its media service

platform MX1 360. VOD and OTT services are complimentary to traditional broadcasting services, and MX1 360 offers customers the complete range of end-to-end services they need to distribute their content everywhere, serving more than 120 VOD platforms, and delivering more than 8,000 hours of streaming video a day. MX1 services have the flexibility and scalability that customers need to deliver to next-generation applications.

MX1 360 is an end-to-end media service platform for broadcasters, TV channels, content owners and rights holders, content aggregators, online platforms and distributors, sports organisations, TV service providers, and enterprise customers. MX1 360 allows these customers to transform, accelerate and globalise their content:

Transform – By transforming content, MX1 ensures that customer's content will be suitable for viewing

in any platform on any screen. Going even further, MX1 enables the localisation of content, the management and archiving of assets, management of metadata, as well as offering customers full control and transparency of their content thanks to versioning and compliance tools.

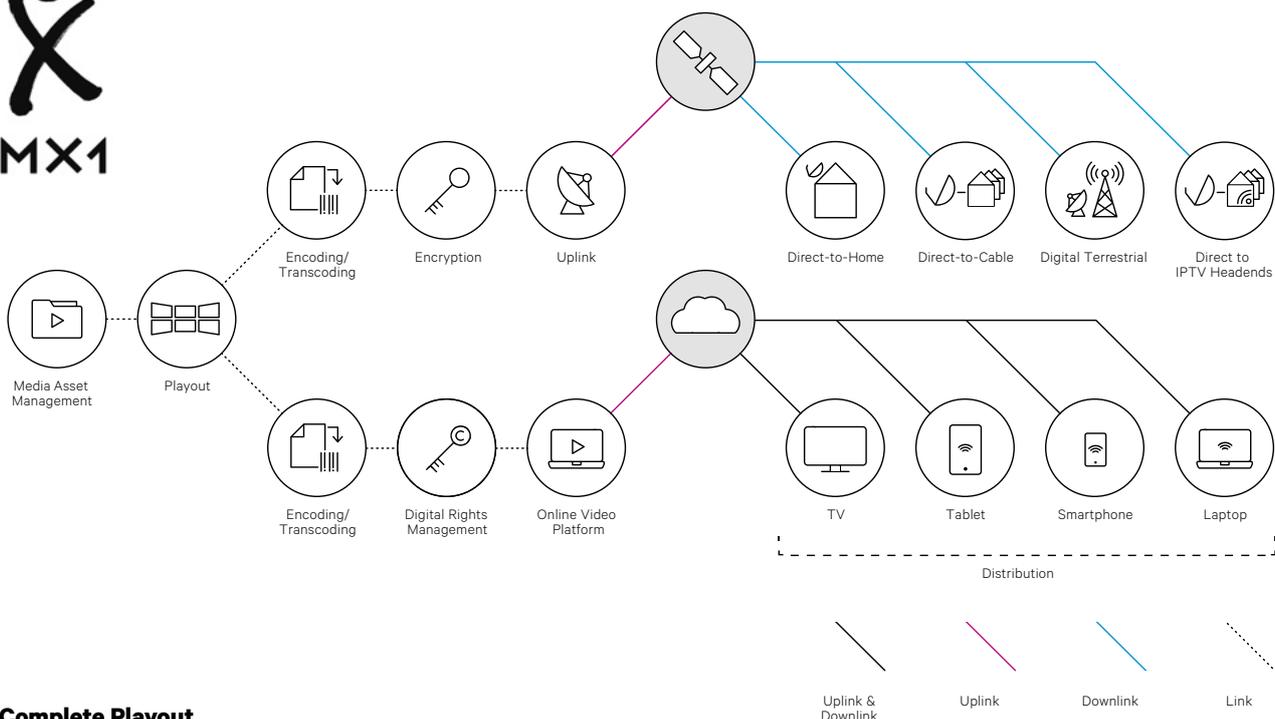
Accelerate – Accelerating content encompasses a wide range of services to help customers diversify the methods they use to monetise their content. This includes packaging content for broadcasters, VOD syndication and online platforms, and incorporates online advertising and monetisation capabilities, viewer engagement tools, and the collection of viewer data and analytics.

Globalise – In order to maximise the monetisation of content completely, the transformation and acceleration must be globalised. And with the combined global network of SES and MX1, content delivery is optimised across satellite, fibre and the Internet to engage with viewers across the world and maximise value, delivering the best possible viewing experience.

HYBRID DISTRIBUTION

Viewers today are watching a variety of content on devices such as TV's, tablets, and smartphones, making management and distribution of content more complex than ever. SES and MX1 are developing the technologies that are needed to meet these demands, such as SAT>IP. Sat>IP technology was developed by SES and partners in order to maximise the benefit of delivering a satellite signal into homes. SAT>IP converts a satellite signal into an IP transmission that can be distributed via a Wi-Fi router throughout a home. Innovations such as these make up the entire portfolio of technology, expertise and experience that SES and MX1 leverage to offer the ultimate in viewer experience. For customers this translates into a global reach and speed to market with a complete end-to-end media and video service package that manages and delivers content anywhere, anytime, and on any screen.

This is why INSIGHT TV worked with SES when it decided to launch one of the world's first 24/7 Ultra HD channels. Owned by Netherlands-based TV Entertainment Reality Network (TERN), INSIGHT TV broadcasts to Europe, the US and Asia. Beyond broadcasting a 24/7 Ultra HD channel, INSIGHT TV wanted to ensure that audiences could also watch content anytime and anywhere. SES, MX1, and its partners rose to this challenge and developed a complete ecosystem of traditional linear broadcast and OTT services in Ultra HD for Insight TV. In doing so they needed to coordinate playout across continents, and find solutions for many broadcast components - such as ad insertion and subtitling - that were never tackled in UHD before. The SES partnership with INSIGHT TV is successful because, together with MX1, SES is one of the only providers that can offer complete content management and playout services, as well as using its global network and secure ground infrastructure to ensure that content is delivered with the best possible viewing experience for a global audience.



Complete Playout

In any broadcast environment, on any device

MEDIA PLATFORMS

Through its media platforms, SES develops entirely new media ecosystems. By combining different aspects of its broadcasting and end-to-end solutions, SES supports customers and partners to successfully cultivate media platforms according to their needs. A media platform can take the shape of adding a new content package or new features to enhance the overall user experience in a market, like HD+, or an entirely new viewing neighbourhood, as SES is supporting in Africa. To achieve this, SES acts as a catalyst, working closely with customers and industry partners, offering customised support using a standard toolbox as a foundation to increase the time to market. This standard toolbox has been built from SES's extensive experience and resources, and includes market research from the satellite monitor framework, CPE design, video distribution, network set-up, installer training, as well as marketing activities and material. The particularly unique touch that SES brings to these projects is the close relationship it develops with customers and partners to achieve success at each stage of key business cycles on any platform.

HD+

SES created the HD+ media platform in 2009, to provide broadcasters in Germany with a method to deliver their HD content to paying audiences via satellite. HD+ is a B2C company, interacting directly with customers to bring HD quality content into their homes. Users of HD+ have access to more than 50 channels in HD quality, including 23 of the largest commercial broadcasters in Germany. To develop this service SES built an entirely new ecosystem for this platform, encompassing satellite services, product management, sales and marketing, and customer care.

Today HD+ has over two million paying subscribers, and with the recent digital switchover in Germany to DVB-T2, even more households are expected to be attracted to the HD+ offering. An offer that is growing in strength as HD+ subscribers benefit from new services, the latest being exclusive

live sports content via the Eurosport package. Football matches as well as Tennis Grand Slams, Cycling highlights and MotoGP will all be available on the extended HD+ offer thanks to a partnership with the leading media company Discovery Networks Germany, Eurosport's parent company.

Additionally, HD+ is expanding its service to meet consumer demand for multi-screen and multi-room viewing. In February 2017 it launched HD+ ExtraScreen, which uses Sat>IP technology to enable viewers to enjoy HD quality video delivered via satellite on their tablets or smartphones. SAT>IP allows for multi-screen and multi-room viewing in HD quality that is dependable, as it is being delivered via satellite, which is why it is perfect for HD+ customers. The current UHD demo channel prepares the ground to complement the commercial offer with even higher picture quality in UHD.

DIGITAL TV PLATFORMS IN EAST & WEST AFRICA

A media platform should always respond to the needs of its market, and in Africa SES has invested significant resources to assist local partners and customers to create successful platforms that meet local demands. By supporting the development of media platforms, SES is supporting a faster digital transition in those regions, as well as acting as an incubator for local channels by lowering cost barriers to broadcast. Creating new viewing neighbourhoods can also open the doors for international investment, attracting foreign broadcasts to the new audiences. By investing in these platforms, SES is supporting a strong video ecosystem that benefits local customers and partners, governments, broadcasters, and enhances the experience of viewers.

The African platforms consist of the East African Platform, serving viewers primarily in Ethiopia and Kenya, and the West African Platform, serving viewers primarily in Ghana and Nigeria. The platform development in each of these countries is evolving according to local needs and regulatory frameworks, and each approach is possible because of the close cooperation of SES with these key stakeholders throughout the project lifespan. As these platforms develop local broadcasters will be able to grow, the digital transition will progress, and viewers are able to access higher quality video with a larger selection of content.

DIE HD+ EMPFANGSWEGE
Ihr Weg zum HD-Genuss

- 1 HD+ Receiver
- 2 HD+ Modul
- 3 HD+ TVkey
- 4 Sky
- 5 Telekom

HD+ Sender-Paket

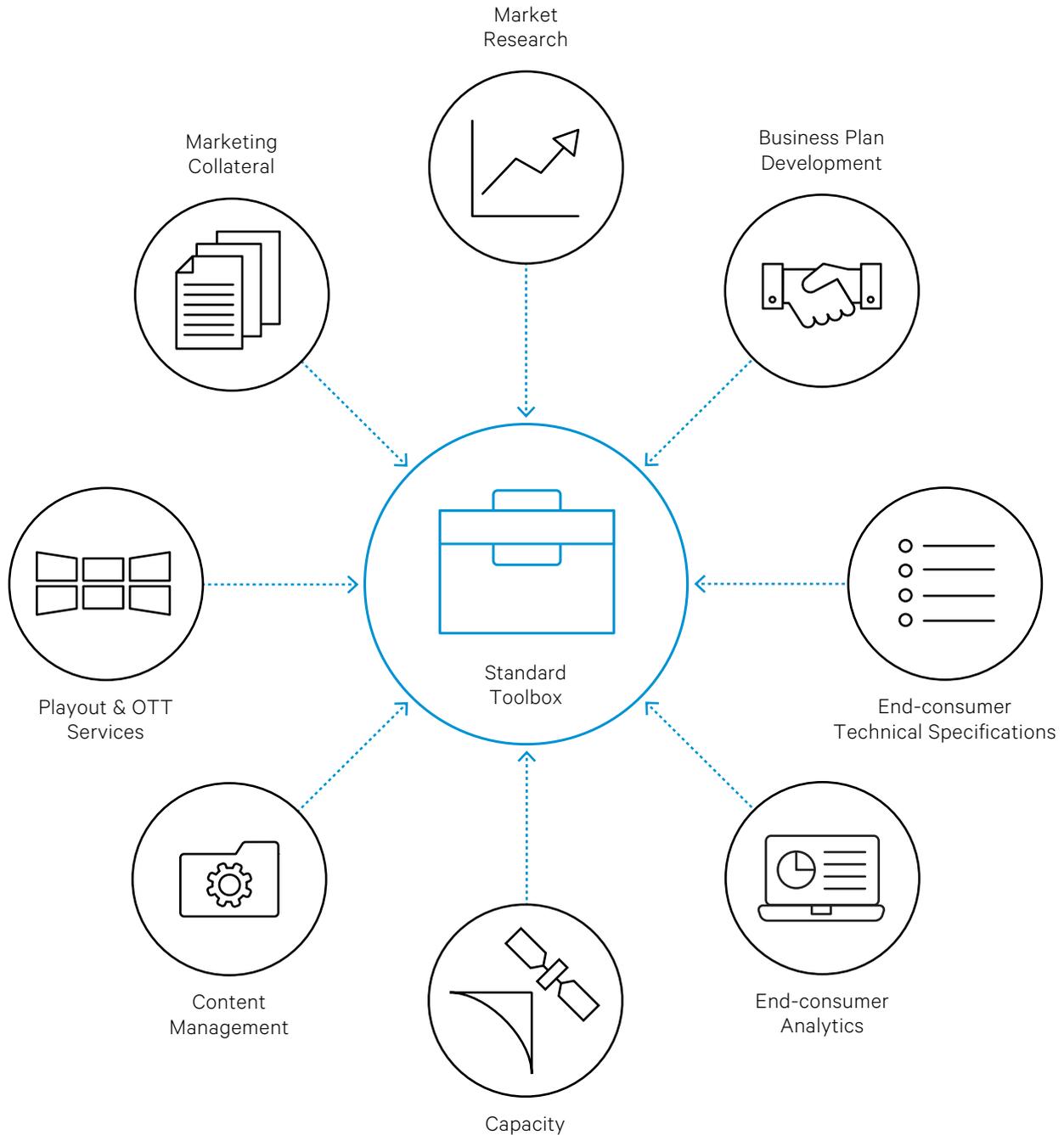
23 private HD-Sender

und über 30 frei empfangbare HD-Sender

ÜBER 50 SENDER IN HD

DVB-T wird abgeschaltet!
Ab 29. März 2017 wird ihr DVB-T TV-Programm abgeschaltet!

Users of HD+ have access to more than 50 channels in HD quality, including 23 of the largest commercial broadcasters in Germany.



SES's standard toolbox helps customers build robust media platforms

EMPOWERING CUSTOMERS

As audience needs change across the world, SES is changing with them, having expanded its offering to serve the complete video value chain and become an experience provider. With this unique combination of capabilities, SES is able to offer enhanced services that simplify video distribution for its customers and react to local market demands globally. Its service portfolio is global, and yet each market develops differently, which is why SES continues its long history of working closely with customers and partners in local markets to rapidly react to opportunities. This is how SES began and works today, and customer centricity will continue to be at the forefront of SES business, creating new success stories by working closely with customers and partners in the new era of video.

SES'S DIFFERENTIATED SOLUTIONS EMPOWER CUSTOMERS

SES HEADQUARTERS

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Luxembourg

REGIONAL OFFICES

Accra | Ghana
Addis Ababa | Ethiopia
Bucharest | Romania
Dubai | United Arab Emirates
The Hague | The Netherlands
Istanbul | Turkey
Johannesburg | South Africa
Kiev | Ukraine
Lagos | Nigeria
London | UK
Madrid | Spain
Mexico City | Mexico
Moscow | Russia
Munich | Germany
Paris | France
Princeton | USA
Riga | Latvia
São Paulo | Brazil
Singapore | Singapore
Stockholm | Sweden
Warsaw | Poland
Washington DC | USA

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