SOLUM
Solution provider.

ESL Presentation

For Industrial customers

March 2023

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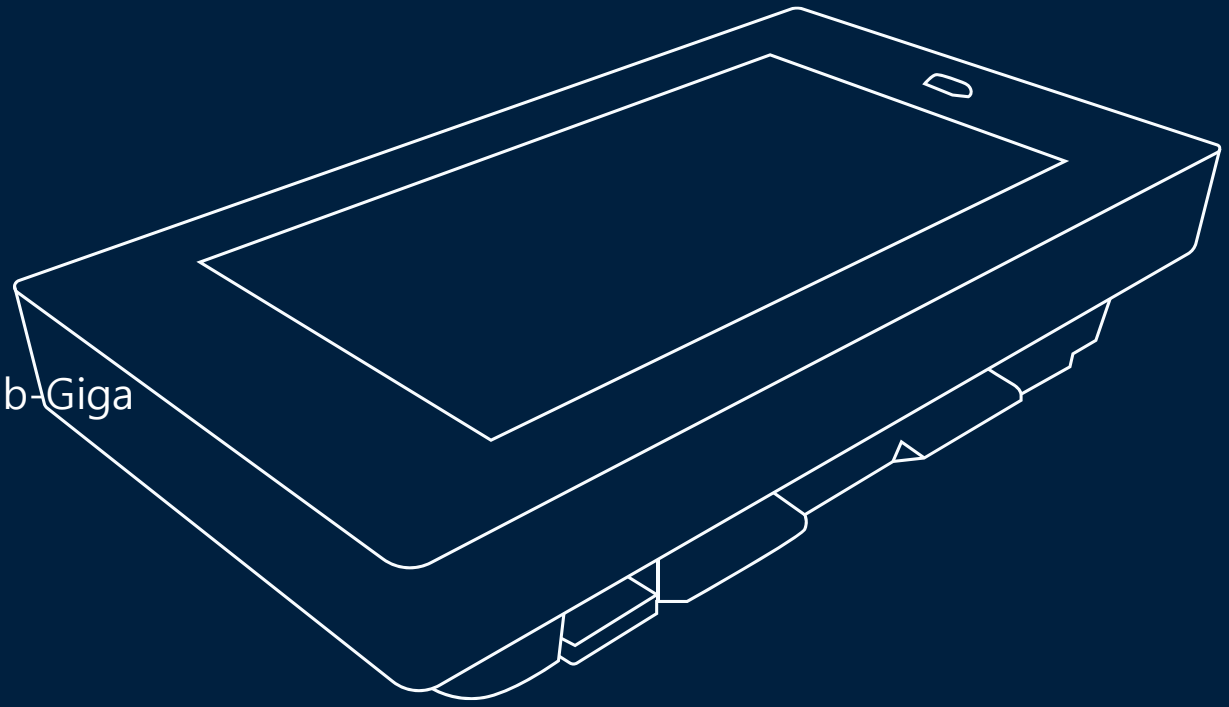

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Chapter 1
About SOLUM

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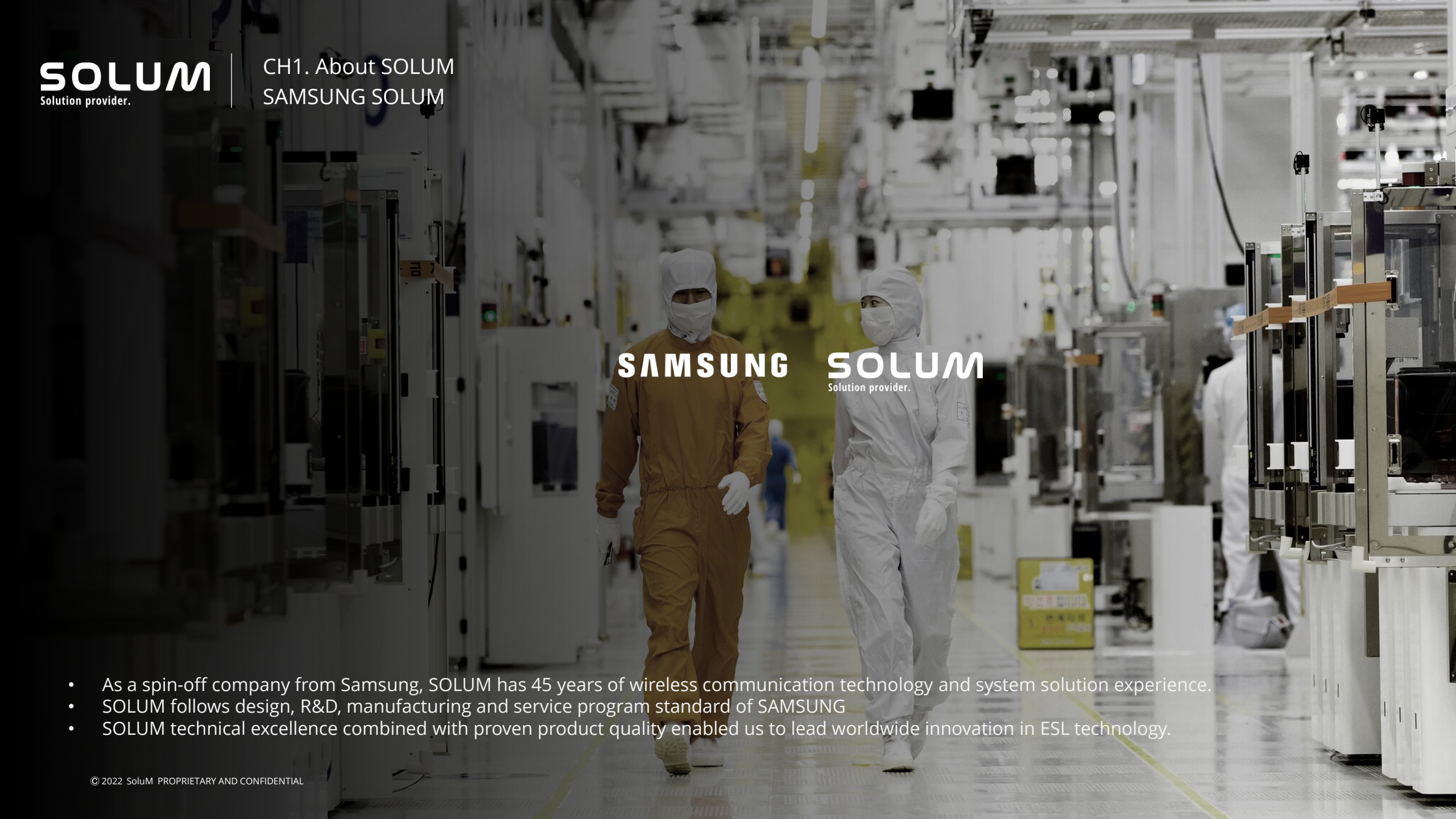
CH1. About SOLUM
SAMSUNG SOLUM



- As a spin-off company from Samsung, SOLUM has 45 years of wireless communication technology and system solution experience.
- SOLUM follows design, R&D, manufacturing and service program standard of SAMSUNG
- SOLUM technical excellence combined with proven product quality enabled us to lead worldwide innovation in ESL technology.

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Rapid Growth and Global Deployment

SOLUM started supplying ESL to Global Top retailers such as LOWE'S, MACY'S, LOBLAW, ROGERS, ALTICE, IKEA, REWE, TESCO and METRO. Over the past 8 years, we have grown at a rapid pace and have now installed over 100 million ESLs throughout 35+ countries, totaling 8,000+ stores worldwide. We have gained a reputation as one of the best ESL vendors in all markets (grocery, department stores, electronics, factory, warehouse and apparel stores) with our server and management software solutions, diverse and differentiated product lineup, and prompt and active customer service.

86+
Million ESLs

in

8,000+
Store across 35+ countries

100 million
Target ESLs shipped by 2021

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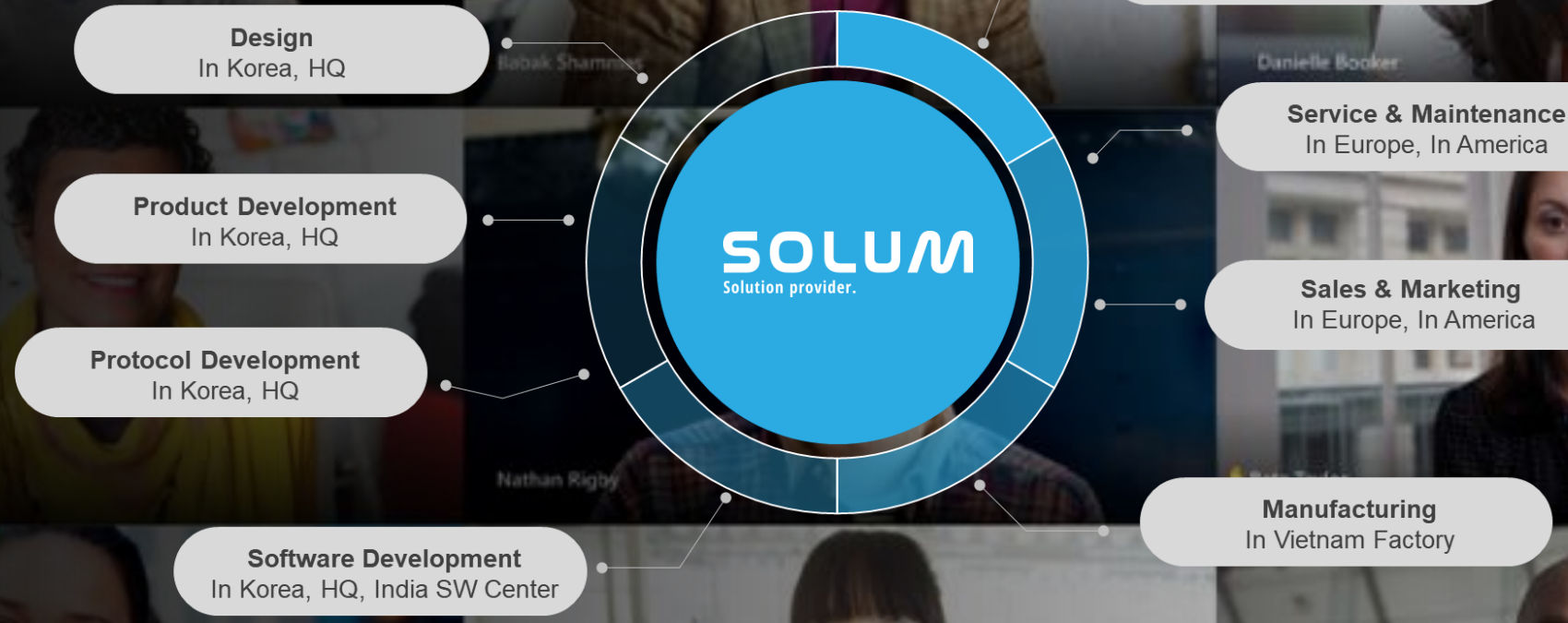
CH1. About SOLUM
Integrated Solution Provider



Design
In Korea, HQ

Product Development
In Korea, HQ

Protocol Development
In Korea, HQ

Software Development
In Korea, HQ, India SW Center

RMA
In Slovakia, US

Service & Maintenance
In Europe, In America

Sales & Marketing
In Europe, In America

Manufacturing
In Vietnam Factory

- The strength of SoluM is we provides the fully integrated in-house solution.
- SOLUM is the only ESL provider who designs and develop every products (HW / SW) and has its own manufacturing facility which enables fast innovation and delivers the best in quality product.

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Chapter 2

Introduction of Newton

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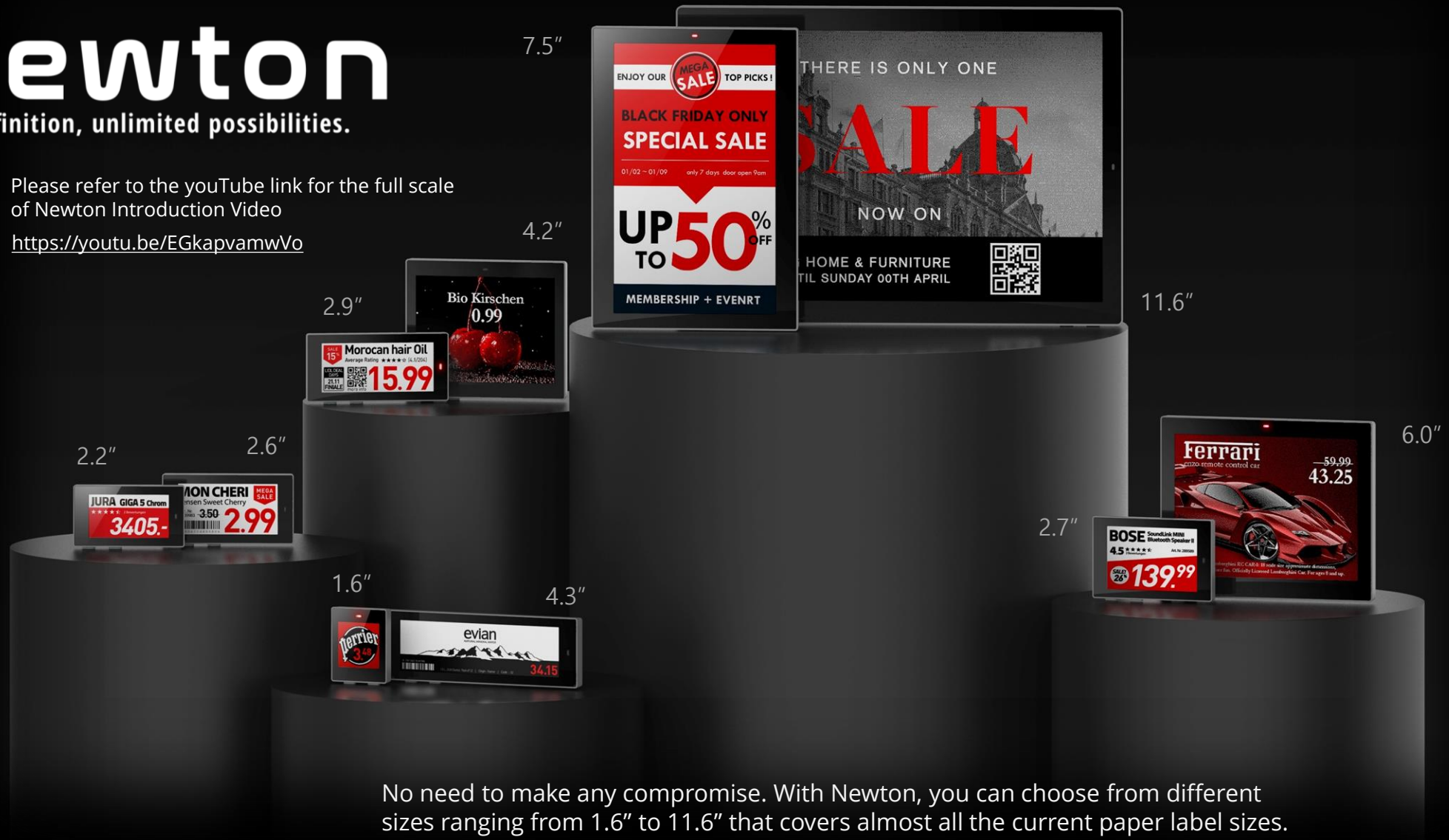
CH2. Introduction of Newton
Newton Sizes

Newton
New definition, unlimited possibilities.

Please refer to the youTube link for the full scale of Newton Introduction Video

https://youtu.be/EGkapvamwVo



No need to make any compromise. With Newton, you can choose from different sizes ranging from 1.6” to 11.6” that covers almost all the current paper label sizes.

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CH2. Introduction of Newton
New Generation of Electronic Shelf Label

SOLUM has developed *the Newton system* –
a special protocol that brings the two biggest changes

Extended battery life.
Real-time update speed.

Powered by this Newton system,
SOLUM launches new generation of Electronic Shelf Label.
Newton.

Please refer to the youtube link for the full scale of Newton Introduction Video

https://youtu.be/EGkapvamwVo

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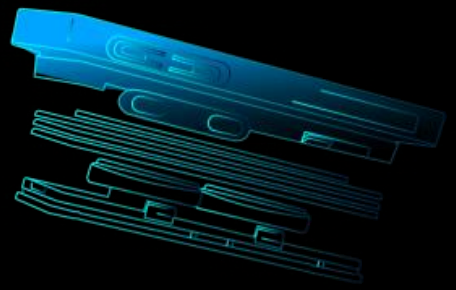
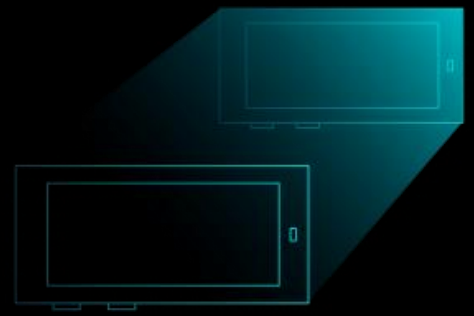
CH2. Introduction of Newton
12 Key Features

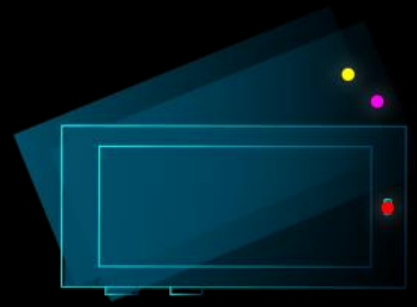


1. Extended Battery Life
For the last 20 years, the general expected lifetime of the ESL has been 5 years. We have managed to increase Newton's battery life to an unparalleled ten years. Extended battery life enables more usage of price update, LED and user interaction etc.



2. Real-time Update Speed
10 times faster speed
than any other RF based ESL.
Display update and LED reaction for several units comes with a few seconds.
3,000 labels can be updated in 4 min with one Gateway.

3. Interactive Buttons
Newton has 2 completely configurable buttons. You can set the command of long and short presses according to your needs. This allows for a more user-interactive usage for better store operation and better shopping experience.



4. 7 Color LEDs
7 Color LEDs with the real-time reaction speed maximizes
store operation efficiency.
The innovation of Newton in the battery life allows more possibility of heavy usage of LEDs. In other LED tags, the LEDs can only be lit on when it's requested to because of the high battery consumption.

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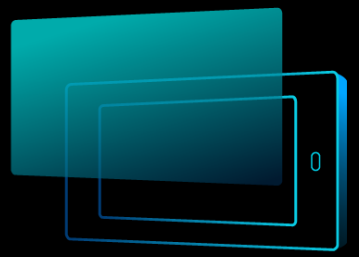
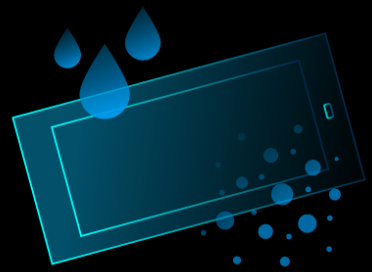
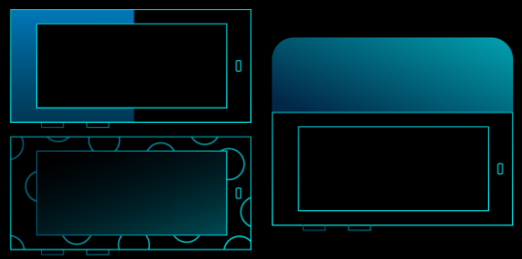
CH2. Introduction of Newton
12 Key Features



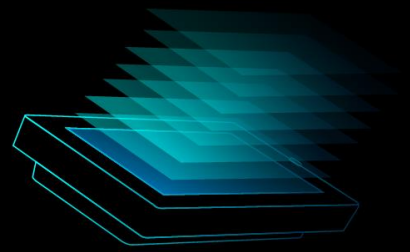
5. Screen Protection
Thanks to screen protection, Newton's screen is 80% stronger than older ESL models—it can handle up to 323kg/m/sqm of shock, making it safer from potential hazards.



6. Water & Dust Proof
Newton is fully water and dustproof. You can put it anywhere, wet or dry in the fish, meat, or garden sections Even the tiniest dust particles won't be able to penetrate it.



7. Design
Newton comes with a whole new sleek and straightforward design giving a premium and modern look to wherever you choose to put it. The real beauty of Newton is the fact that it is customizable. With Newton, you can incorporate
your company's colors, patterns, and company logo. Now, that's what we call branding.



8. 7 Pages
Newton has 7 pages storage capacity. Different layouts such as special promotion and stock unavailability can be stored in Newton and displayed on right moment by pressing buttons.
Customers also can flip through the different pages to access more product information.

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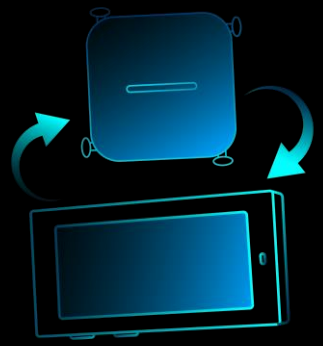
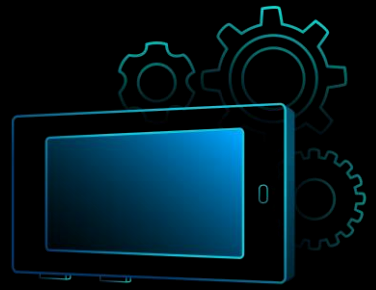
CH2. Introduction of Newton
12 Key Features

9. Geo-location
All Newton labels come with its own label positioning functionality. You can find the simplest and the most cost-effective way of doing this.

10. NFC
Newton's built-in NFC capabilities allow you to perform various user interaction activities both for operators and shoppers.



11. Collision-free communication
Newton allows more than 60 RF channels, giving a lot easier to select the channels. It also has Auto Channel Selection to avoid any RF interference.



12. Easy management
Installation and removal have never been easier with Newton's easy locking system. Newton comes with battery pack which makes it also easier for the battery replacement process.

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CH2. Introduction of Newton

Newton Specification

MODEL	1.6″	2.2″	2.6″	2.7″	2.9″	4.2″	4.3″	6.0″	7.5″	11.6″
DIMENSION(mm)	36.7 x 45.0 x 13.1	67.1 x 37.4 x 13.1	79.3 x 42.4 x 13.1	76.0 x 49.5 x 13.1	86.0 x 41.3 x 13.1	98.1 x 83.8 x 14.5	130.3 x 42.4 x 13.9	133.0 x 109.0 x 14.7	125.0 x 183.0 x 15.2	192.0 x 268.0 x 21.9
ACTIVE DISPLAY AREA(mm)	27.0 x 27.0	48.1 x 26.0	60.1 x 30.7	57.3 x 38.1	67.6 x 29.6	84.8 x 63.6	105.4 x 30.7	114.9 x 85.8	163.2 x 97.9	163.0 x 244.5
RESOLUTION(Pixel)	200 x 200	296 x 160	360 x 184	300 x 200	384 x 168	400 x 300	522 x 152	600 x 448	800 x 480	640 x 960
PIXEL DENSITY	184 dpi	156 dpi	152 dpi	133 dpi	144 dpi	120 dpi	125 dpi	132 dpi	126 dpi	100 dpi
DISPLAY TECHNOLOGY	Full Graphic E-Ink Display									
PIXEL COLORS	BW(Black, White) / BWR(Black, White, Red) / BWY(Black, White, Yellow)								BW(Black, White) / BWR(Black, White, Red)	
VIEWING ANGLE	Nearly 180°									
USABLE PAGES	Up to 7 pages	Up to 7 pages	Up to 7 pages	Up to 7 pages	Up to 7 pages	Up to 7 pages	Up to 7 pages	Up to 3 pages	Up to 3 pages	Up to 3 pages
OPERATING TEMPERATURE	0 ~ 40° ※ The expected battery life is 10 years in 10°~40°, 5 years in 0°~10° and 3 years in -0°~-25°.									
BATTERY	CR2450 x 1	CR2450 x 2	CR2450 x 2	CR2450 x 2	CR2450 x 2	CR2450 x 2	CR2450 x 2	CR2450 x 4	CR2450 x 4	AA x 4
BATTERY LIFETIME	Up To 5 years (2 Update/day)	Up To 10 years (2 Update/day)	Up To 10 years (2 Update/day)	Up To 10 years (2 Update/day)	Up To 10 years (2 Update/day)	Up To 10 years (2 Update/day)	Up To 10 years (2 Update/day)	Up To 10 years (1 Update/day)	Up To 10 years (1 Update/day)	Up To 10 years (1 Update/day)
ENCRYPTION	128-Bit AES									
COMPLIANCE	CE, ROHS, FCC									
NFC	FeliCa NFC Forum Type 3									
WATERPROOF	IP67									
BUTTON	2 Buttons									
LED	7 Colors(Red/Green/Blue/Yellow/Cyan/Magenta/White)									
ESL OPERATING FREQUENCY	2.4 Ghz									
WIRELESS FIRMWARE UPDATE	Yes									

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CH2. Introduction of Newton
Newton Gateway

Images from the system are sent to the Electronic
Shelf Label units through the Gateways.
It is only appropriate that speed and capacity are vital.

SOLUM has come up with a renewed Gateways
for our newest Newton line-up.

Newton's implementation is now faster, more reliable and cost-efficient.

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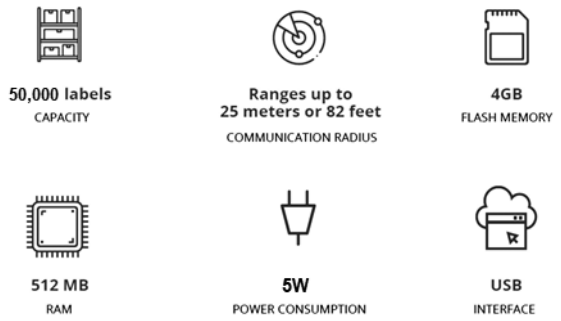
CH2. Introduction of Newton
Newton USB Gateway

We also put into consideration the cost efficiency of our client for the small scale ESL implementation.

Instead of installing the Gateway in the ceiling and setting up cables, the Newton USB-gateway can be connected to your computers or even right in the WIFI access point.

The Gateway itself has 5K label capacity and is already systematically integrated with the world's leading WiFi access point provider (Aruba, Extream Networks and Samsung).



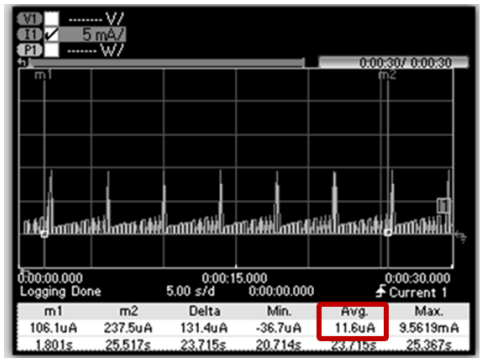
Chapter 3

Features of Newton

CH3. Features of Newton
Extended Battery Life

Changing batteries every 5 years is now a thing of the past, Newton has unparalleled 10 years battery life.

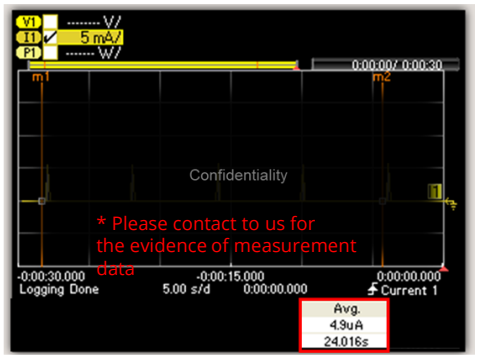
Current model



Average Current **11.6uA**

~5 YEARS

Newton



Average Current **4.9uA**

over **10 YEARS**

Details of Newton Battery Life	
Average battery consumption current	Others : 12uA Newton : 5uA
Expected battery life (2 updates/day, 100 sec LED/day)	1.3”~1.6” : 7 years 2.2”~11.6” : 13 years
Battery Warranty (2 updates/day, 100 sec LED/day)	1.3”~1.6” : 5 years 2.2”~11.6” : 10 years
Maximize usage of LED (guaranteed over 5 years of battery life)	1 hour LED blinking / day
Maximize usage of price / display update (guaranteed over 5 years of battery life)	10 price/display updates / day

* Others: other RF based ESL

Benefits of Newton extended battery life

- No need of ESL re-investment in year 6. x2 life usage. x2 return on investment.
- No risk of mal-function, price error from low/out of battery before year 10.
- No additional time / cost to find out low/out of battery label and replace battery before year 10.
- More LED, price/display update usage.

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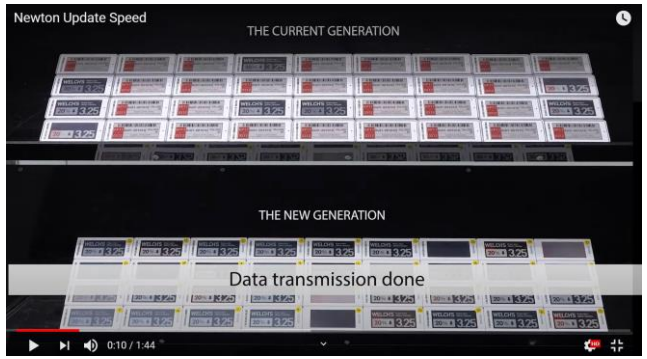
CH3. Features of Newton
Real-time Speed

Newton has about x 10 times faster update speed than any other RF based ESL on the market.



Please refer to the youtube link for the Newton update speed video

https://youtu.be/Q0Ag8Axw0x4

Details of Newton Real-time Speed	
Newton wake up period	3 or 6 sec. Configurable.
1 label assignment speed	Others: 30 sec~1 min Newton: 5 ~ 10 sec
1 label image update speed	Others: 30 sec~1 min Newton: ~ 5 sec
1 label LED reaction speed	Others: 30 sec~1 min Newton: ~ 5 sec
1 GW 5 min update speed capability	Others: 200pcs~500pcs Newton: 4,000pcs
1 GW 1 hour update speed capability	Others: 2,500pcs~4,500pcs Newton: 46,000pcs

* Others: other RF based ESL

Benefits of Newton real-time speed

- Faster ESL installation / management time thanks to faster assignment speed
- More availability and less risky for price change during store operation hour.
- Pick by light (click and collect) availability thanks to rea-time LED reaction speed.
- Real-time button press confirmation from server by giving a LED blinking as a confirm sign.

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CH3. Features of Newton
Interactive Buttons

Newton has two programmable buttons which gives more possibilities of user interactive ESL usage.
There are 5 different function setting is available for each size, model and label. Left short, right short, left long, right long and left/right together for long.

Page flipping

Smart ordering

Job confirmation

Category	Possible usage for store operation
Page flip (7 page available)	• Flip to additional operation information such as promotion schedule, stock qty, QR/Barcode, NFC landing page, battery status etc. • Flip to temporary unavailability sign for shoppers
Job confirmation (by turning off LED)	• Picking confirm • Re-stocking confirm • Discount sticker labeling confirm • Battery replacement confirm
Smart Ordering (by a long press)	• Request for re-stocking (empty shelf reporting) • Request for stock ordering
Time/date update	• Shelf on display time/date update for deli, meat or fish counter
Turn on / off the label	• Turn on the label from the box • Turn off the label for storage

Category	Possible usage for shopper
Page flip (7 page available)	• Flip to additional product information such as description, review allergen, ingredient, recipe, QR code to online shop etc.
Service call	• Call store staff for a help.

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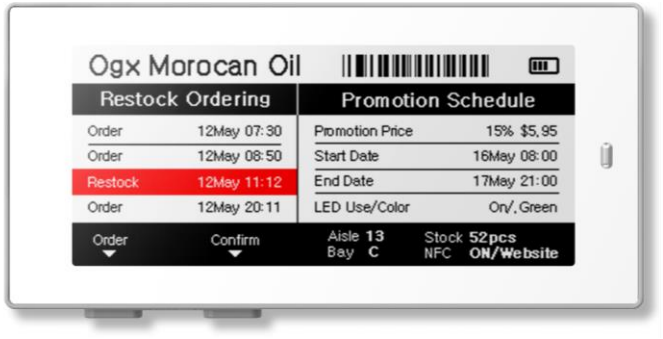
CH3. Features of Newton
7 Pages

- Newton has 7 pages of storage.
- Each page can have a different layout : additional product information, special promotions, inventory information, etc.
- Page flip via Newton Remote, PDA App, built-in buttons, or the server.
- Page flipping can also be scheduled in advance through the server to prepare for flash sales or updates.

Additional pages for store operation



Restocking ordering / Promotion Schedule

Unavailability notification

Pick by light history

Barcode page

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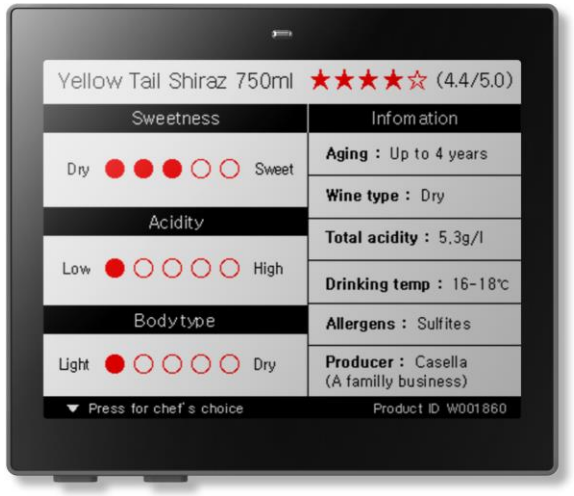
Newton has 7 pages storage capacity.
Different layouts such as special promotion and stock unavailability can be stored in Newton and displayed on right moment by pressing buttons.
Customers also can flip through the different pages to access more product information.

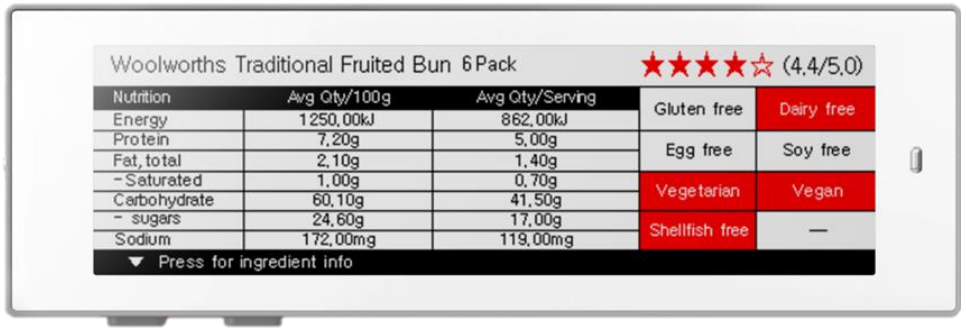
Additional pages for shopper



Product detailed information

Recommendation and QR link

Ingredient



Allergen information

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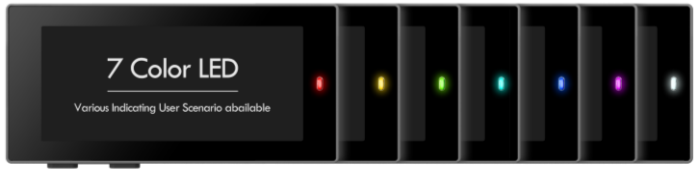
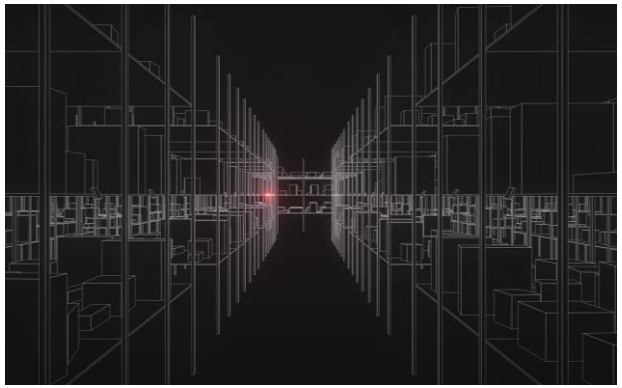
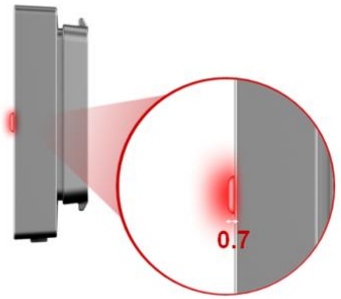
CH3. Features of Newton
7 color LED

7 LED colors allows more simultaneous and specific usage by allocating colors to each manager or giving a different meaning. This bright and multi-color LED can be visible from 180 degrees



Red, Yellow, Green, Sky Blue, Blue, Purple, White





180-degree visibility

Feature of Newton LED	
Reaction speed per unit	• ~3 sec
Available LED usage for 5 years battery life.	• 1 hour per a day
Color	• 7 colors (Red, Yellow, Green, Sky Blue, Blue, Purple, White) • Multi-operator identification • Job status identification
Pattern	• Default: fast blinking pattern • Custom pattern is configurable

Possible Usage	Description
Picking / re-stocking indication	• Indication of product location of picking and re-stocking. • Gives a different color code to each operators. • Gives a certain color code for the last picking item and the job complete followed by button confirmation
Expiry date alarm	• Indication of shelf where the expiring item is belong to. • Gives a different color code based on remaining date/time.
Low battery indicator	• Indication of a label with low battery
Indication for shoppers	• Indication of product information such as promotion, new arrival, pay back, allergen alert and organic.

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We can't have the battery life lasting longer than the unit itself.
NEWTON's screen protection can handle up to 323 kg of shock - 80% improvement from the older generations - making it safer from potential hazards.

* Test Device : FGN- 50B

M2	Competitor	M1	Newton
180.1 N	200.9 N	283.7 N	323.4 N

WEAK STRONG

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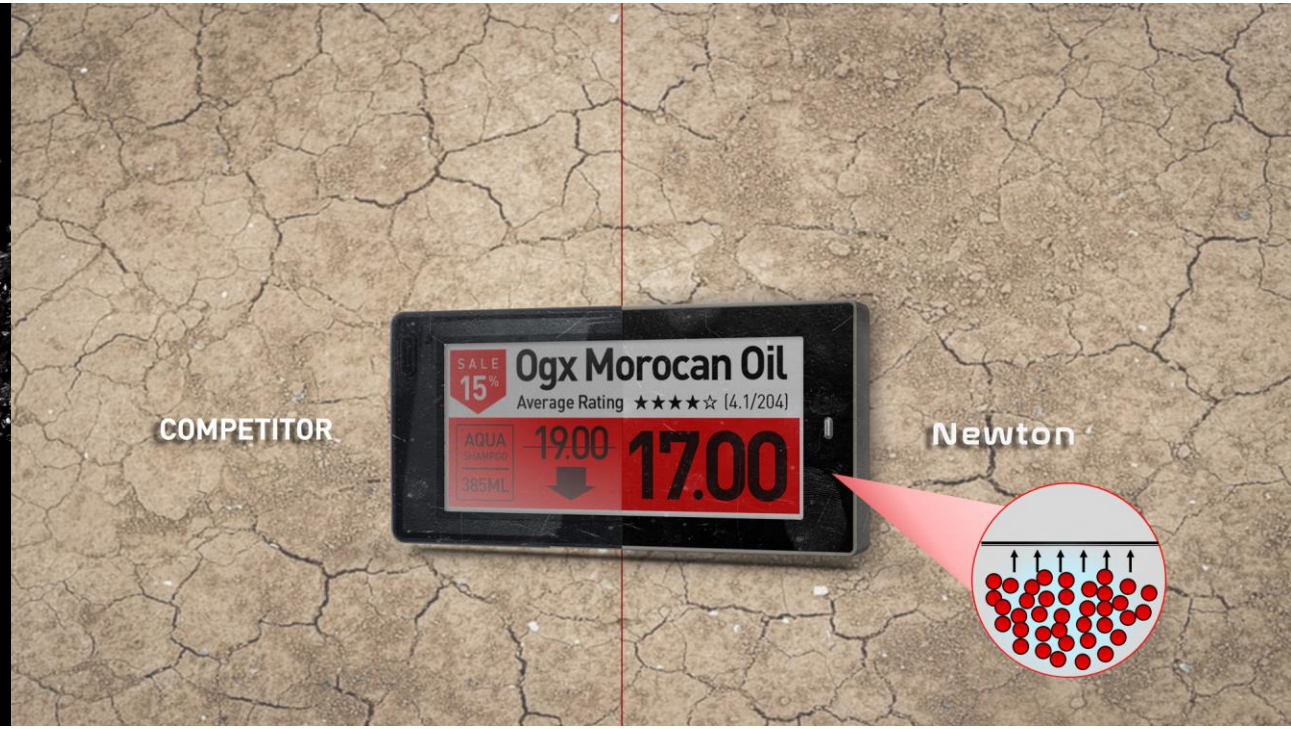
CH3. Features of Newton
Water & Dust Proof

Newton is fully water and dustproof. It can last up to 30 minutes in water. You can put it anywhere, wet or dry in the fish, meat, or garden sections.

The screen is also completely sealed to prevent the display colors from fading or drying out. Now, your display can have that crisp color for a more extended period.



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CH3. Features of Newton Location Based Service

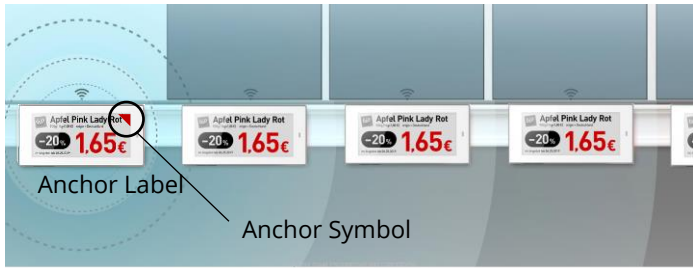
SOLUM provides the Location Based Service based on Anchor technology. This is the turnkey solution from tag-positioning, map-generation to web and mobile application service. The integration with retailer's own systems such as ERP and e-commerce are also available for value added service like product locating and navigation.

The Anchor has to be installed in a gondola (in every 1~2 meters) and its position is registered to a digital map. Each Newton tag measures a signal strength from Anchors nearby and report the nearest (strongest signal) Anchor to the server. In this way, we can identify the location of a tag. The location data of a tag is automatically collected 3 times which is configurable by a server side.

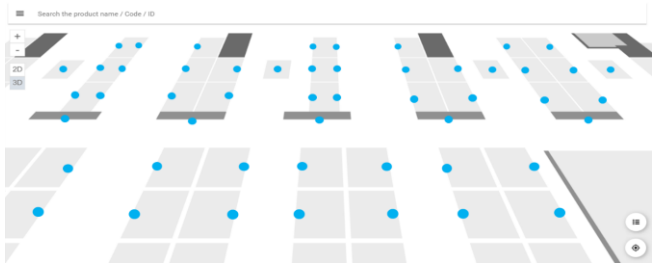
The accuracy is then in about 1~2 meter as the amount of interval between Anchors. It's not the most accurate locating solution but this is the most cost competitive and easy to implement solution as it doesn't need any additional infrastructure nor a big server investment for large image data processing. It just needs the Anchor assignment to one of the label on the shelf.

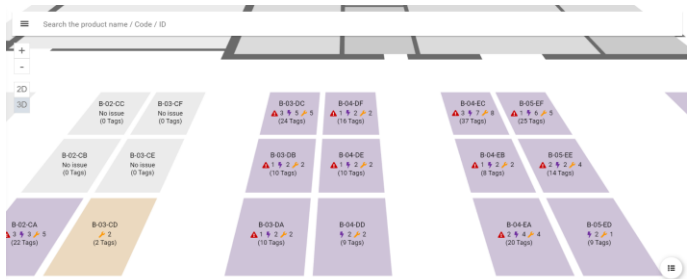
The lack of accuracy can be covered with LED blinking. Right after user search a product then a certain color of LED can be lit on to indicate the product.

With the synergy of Newton's real-time LED reaction speed and LBS service, SOLUM can provide the fastest and the most effective pick by light (click and collect) use case.

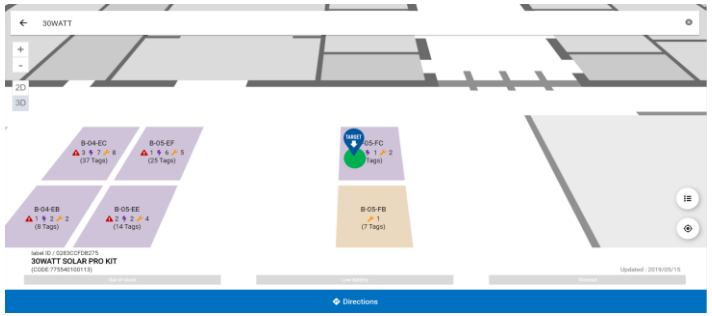


[Signal strength measurement between an Anchor label and a label]


[Anchor label registration and mapping on the map]


[the overview image of LBS application showing the status of a shelf]

[Shows the list of labels of the store and categorized by status]


[Search and mark on a target label]

[Shows the navigation service to a target label]

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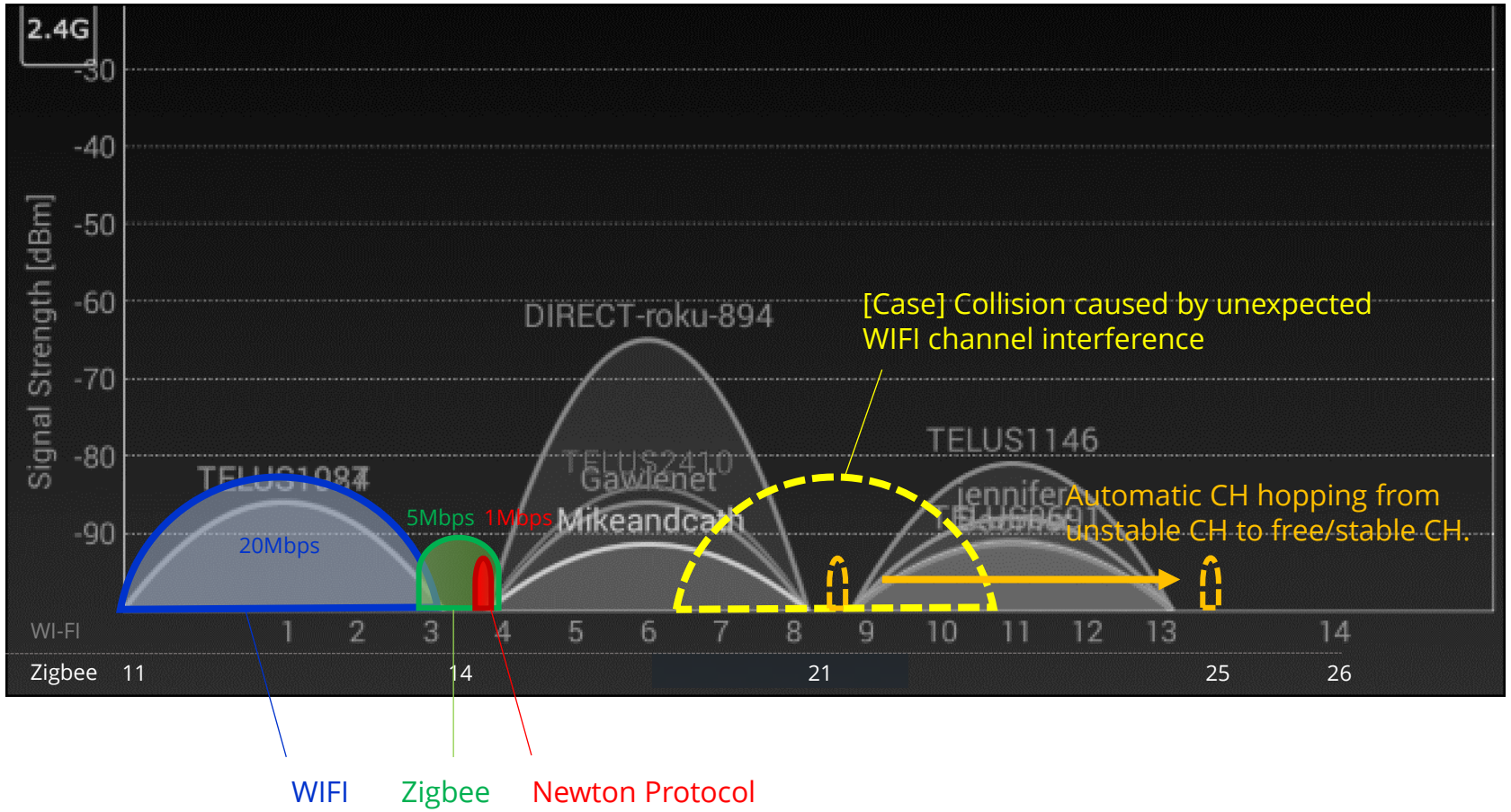

Compared to Zigbee protocol which has about 11~16 available RF channel, Newton Protocol has about over 60 available RF channel which gives much easier CH setting environment.

Newton Auto Channel Section function gives a CH hopping capability when there is a collision between unexpected WIFI interference to make sure the CH for Newton Gateway is always on the clean/free CH.

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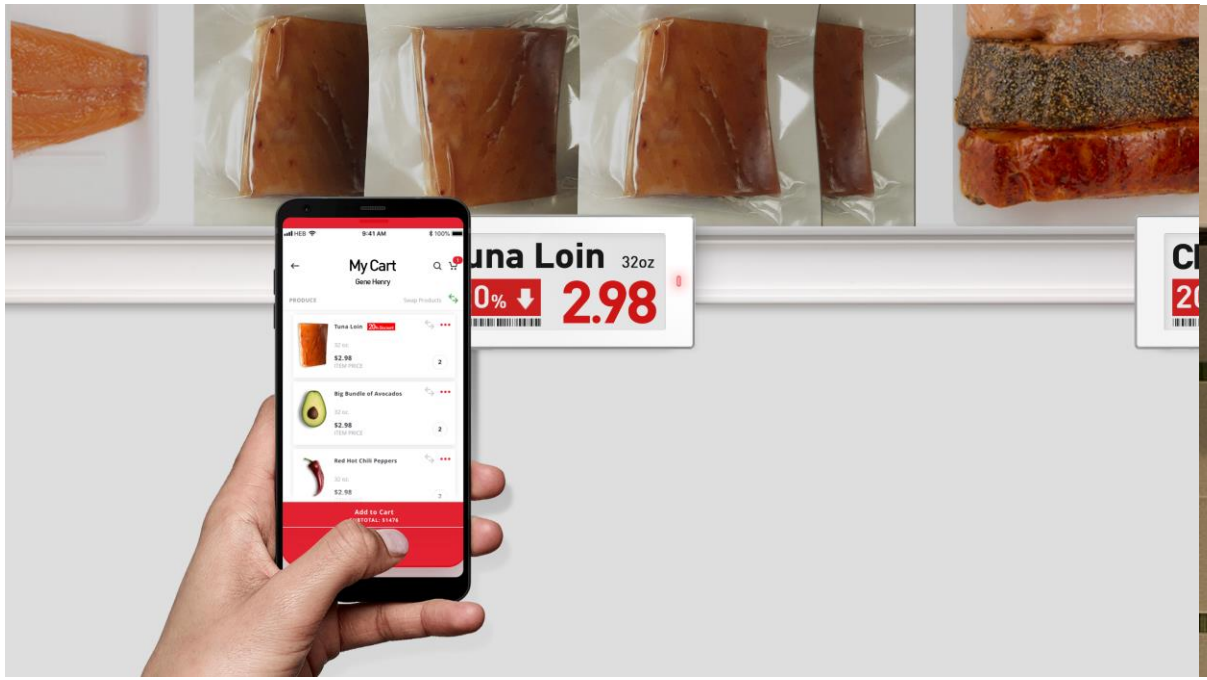
Newton has its free-build in NFC functionality for mobile device interactive applications such as shelf-checkout, online store link and digital coupon etc.



SOLUM also offers a special label with Active NFC functionality for NFC card interactive application such as tap & go.

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Chapter 4

ESL Solution for Industrial: Newton range & M3 Sub-giga Range

Please refer to the YouTube link to see how Newton can improve the workflow in your factory and warehouse.
https://www.youtube.com/watch?v=l60ZgM2spJk

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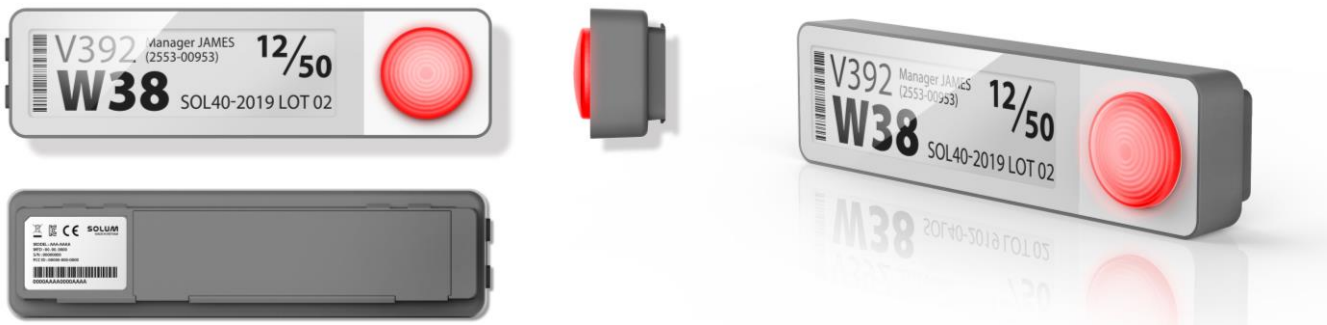
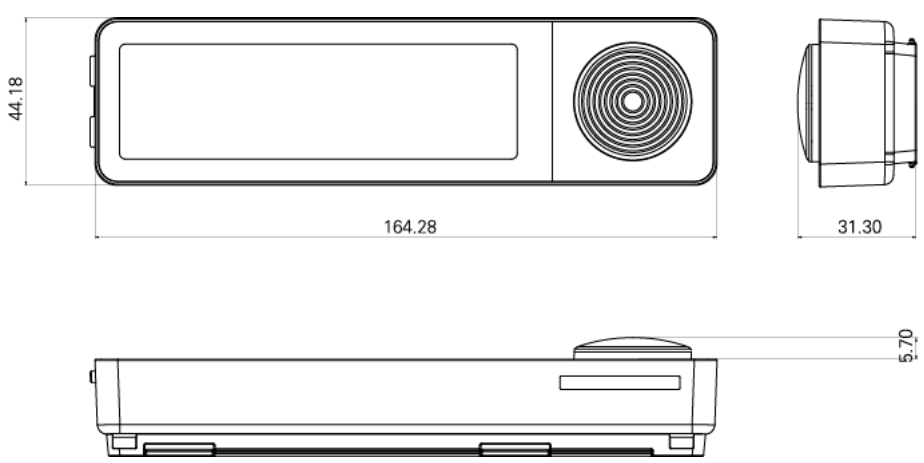
CH4. M3 Sub-Giga

4.3” Pick-by-light





MODEL	EL043DWWRA/EEU
DIMENSION	164.28 × 44.18 × 31.30 mm / 6.46 × 1.73 × 1.23 inch
ACTIVE DISPLAY AREA	105.4 × 30.7 mm / 4.14 × 1.20 inch
RESOLUTION (Pixel)	522 × 152
PIXEL DENSITY	125 dpi
DISPLAY TECHNOLOGY	Full Graphic E-ink Display
BEZEL COLOR	White
PIXEL COLORS	BW / BWR
VIEWING ANGLE	Nearly 180˚
USABLE PAGES	Default: 3pages, Optional: Up to 7 Pages
OPERATING TEMPERATURE	0 ~ 40℃ (32 ~ 104℉)
BATTERY	AA × 4ea
BATTERY LIFETIME	Up To 5 Years (2 Update &100 led blinking /Day) ※ 3 years in 0°~10°
ENCRYPTION	128-Bit AES
COMPLIANCE	CE, RoHS
NFC	MIFARE® NFC Forum Type 2
WATERPROOF	IP57
BUTTON	3 Buttons
LED	7 Colors (Red/Green/Blue/Yellow/Cyan/Magenta/White)
ESL OPERATING FREQUENCY	Sub-Giga (863~868MHz / 902~928MHz)
WIRELESS FIRMWARE UPDATE	Yes

※ This specification May varies depending on the installation environment and user scenario.

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CH4. M3 Sub-Giga

2.9” LED Button

MODEL	EL029D3WRA/EEU
DIMENSION	86.0 × 41.3 × 13.1 mm / 3.38 × 1.62 × 0.51 inch
ACTIVE DISPLAY AREA	67.6 × 29.6 mm / 2.66 × 1.16 inch
RESOLUTION (Pixel)	384 × 168
PIXEL DENSITY	144 dpi
DISPLAY TECHNOLOGY	Full Graphic E-ink Display
BEZEL COLOR	White or Black, Customizable Color(Optional)
PIXEL COLORS	BW / BWR / BWY
VIEWING ANGLE	Nearly 180˚
USABLE PAGES	Up to 7 pages
OPERATING TEMPERATURE	0 ~ 40℃ (32 ~ 104℉)
BATTERY	CR2450 × 2ea
BATTERY LIFETIME	Up To 5 years (2 Update/day) ※ 3 years in 0°~10°
ENCRYPTION	128-Bit AES
COMPLIANCE	CE, RoHS, FCC
NFC	FeliCa NFC Forum Type 3
WATERPROOF	IP67
BUTTON	2 Buttons
LED	7 Colors (Red/Green/Blue/Yellow/Cyan/Magenta/White)
ESL OPERATING FREQUENCY	Sub-Giga (863~868MHz / 902~928MHz)
WIRELESS FIRMWARE UPDATE	Yes

※ This specification May varies depending on the installation environment and user scenario.

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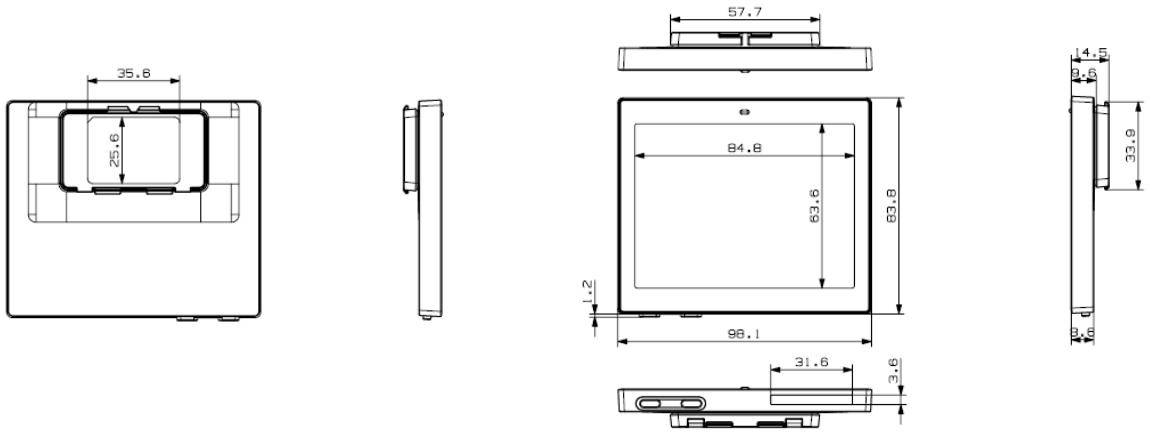
CH4. M3 Sub-Giga

4.2” LED Button



MODEL	EL042D3WRA/EEU
DIMENSION	98.1 × 83.8 × 14.5 mm / 3.86 × 3.29 × 0.57 inch
ACTIVE DISPLAY AREA	84.8 × 63.6 mm / 3.33 × 2.50 inch
RESOLUTION (Pixel)	400 × 300
PIXEL DENSITY	120 dpi
DISPLAY TECHNOLOGY	Full Graphic E-ink Display
BEZEL COLOR	White or Black, Customizable Color(Optional)
PIXEL COLORS	BW / BWR / BWY
VIEWING ANGLE	Nearly 180˚
USABLE PAGES	Up to 7 pages
OPERATING TEMPERATURE	0 ~ 40℃ (32 ~ 104℉)
BATTERY	CR2450 × 2ea
BATTERY LIFETIME	Up To 5 years (2 Update/day) ※ 3 years in 0°~10°
ENCRYPTION	128-Bit AES
COMPLIANCE	CE, RoHS, FCC
NFC	FeliCa NFC Forum Type 3
WATERPROOF	IP67
BUTTON	2 Buttons
LED	7 Colors (Red/Green/Blue/Yellow/Cyan/Magenta/White)
ESL OPERATING FREQUENCY	Sub-Giga (863~868MHz / 902~928MHz)
WIRELESS FIRMWARE UPDATE	Yes

※ This specification May varies depending on the installation environment and user scenario.

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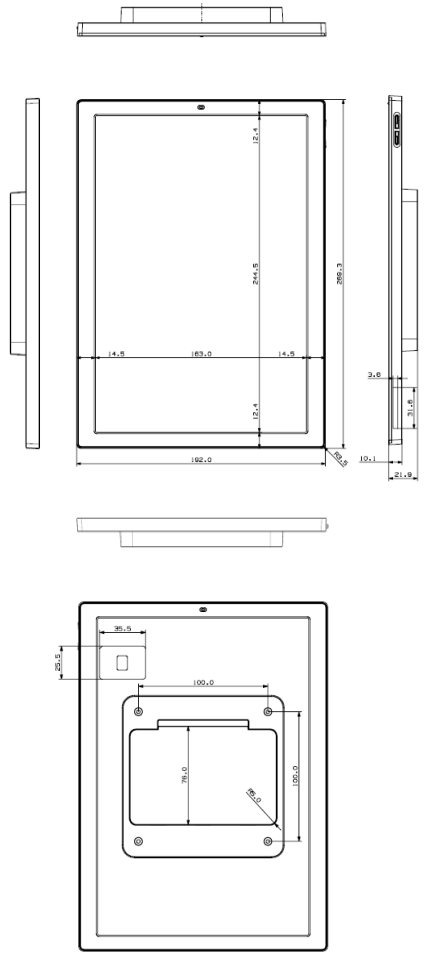
11.6” LED Button



MODEL	EL116D3WRA/EEU
DIMENSION	192.0 × 269.3 × 21.9 mm / 7.56 × 10.60 × 0.86 inch
ACTIVE DISPLAY AREA	163.0 × 244.5 mm / 6.41 × 9.62 inch
RESOLUTION (Pixel)	640 × 960
PIXEL DENSITY	100 dpi
DISPLAY TECHNOLOGY	Full Graphic E-ink Display
BEZEL COLOR	White or Black, Customizable Color(Optional)
PIXEL COLORS	BW / BWR / BWY
VIEWING ANGLE	Nearly 180˚
USABLE PAGES	Up to 3 pages
OPERATING TEMPERATURE	0 ~ 40℃ (32 ~ 104℉)
BATTERY	AA × 4ea
BATTERY LIFETIME	Up To 5 years (1 Update/day) ※ 3 years in 0°~10°
ENCRYPTION	128-Bit AES
COMPLIANCE	CE, RoHS, FCC
NFC	FeliCa NFC Forum Type 3
WATERPROOF	IP67
BUTTON	2 Buttons
LED	7 Colors (Red/Green/Blue/Yellow/Cyan/Magenta/White)
ESL OPERATING FREQUENCY	Sub-Giga (863~868MHz / 902~928MHz)
WIRELESS FIRMWARE UPDATE	Yes

※ This specification May varies depending on the installation environment and user scenario.

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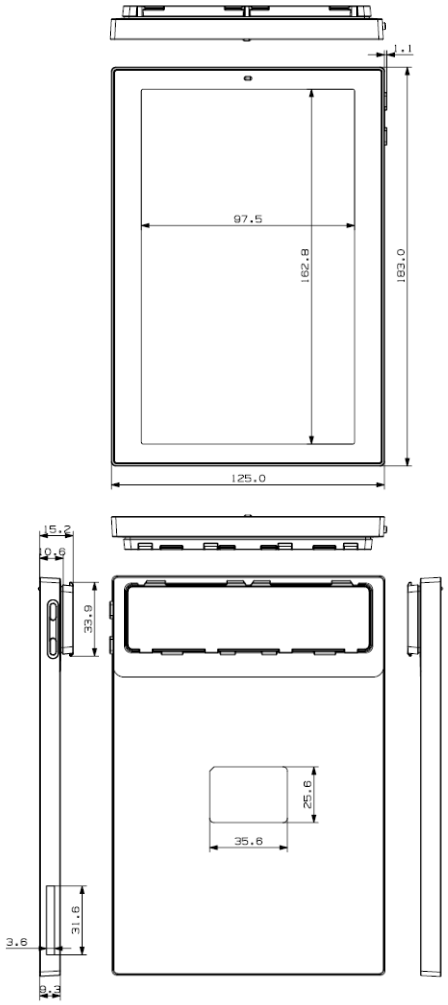
CH4. M3 Sub-Giga

7.5” LED Button



MODEL	EL075D3WRA/EEU
DIMENSION	125.0 × 183.0 × 15.2 mm / 4.92 × 7.20 × 0.59 inch
ACTIVE DISPLAY AREA	97.5 × 162.8 mm / 3.84 × 6.41 inch
RESOLUTION (Pixel)	800 × 480
PIXEL DENSITY	126 dpi
DISPLAY TECHNOLOGY	Full Graphic E-ink Display
BEZEL COLOR	White or Black, Customizable Color(Optional)
PIXEL COLORS	BW / BWR
VIEWING ANGLE	Nearly 180˚
USABLE PAGES	Up to 3 pages
OPERATING TEMPERATURE	0 ~ 40℃ (32 ~ 104℉)
BATTERY	CR2450 × 4ea
BATTERY LIFETIME	Up To 5 years (1 Update/day) ※ 3 years in 0°~10°
ENCRYPTION	128-Bit AES
COMPLIANCE	CE, RoHS, FCC
NFC	FeliCa NFC Forum Type 3
WATERPROOF	IP67
BUTTON	2 Buttons
LED	7 Colors (Red/Green/Blue/Yellow/Cyan/Magenta/White)
ESL OPERATING FREQUENCY	Sub-Giga (863~868MHz / 902~928MHz)
WIRELESS FIRMWARE UPDATE	Yes

※ This specification May varies depending on the installation environment and user scenario.

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Chapter 5

Use cases:

Pick by Light
Smart Ordering
Trolley Tracking
Roaming Solution
Equipment management
Manufacturing Instructions
Job Instructions
Work Manual
Information Sharing

Chapter 5
Use cases

Every organization is different. SOLUM designed Newton with that in mind, therefore allowing for limitless flexibility with each component. Each feature on Newton carries with it the promise of endless user-centric applications specific to your needs.

Increased business mobility.
Scalable capacit
y
More possibilities.

USE CASE 1: Information Sharing Via Newton

INFORMATION SHARING VIA NEWTON

Information Sharing via digital display uses customizable, interactive graphics on a screen to pass on information to customers or staff. Unlike regular paper labels, Newton uses e-paper and e-ink, allowing for a wide viewing angle and low power requirements.

Newton ESLs come in various sizes and formats, which gives you the flexibility to use them in a wide variety of ways. And since ESLs run on batteries, unlike wired solutions, you can pretty much place them anywhere in your facility.

Thanks to the 7-page capability of Newton, anyone can access information easier and faster than ever before. Newton's other features include NFC, LED, and interactive buttons, all of which serve to provide you with more versatility. In so doing, we fulfill our promise of unlimited possibilities.

Problems with Traditional Solutions

1 **Difficult to update**
Workers will have to manually up date the display by printing new information to distribute to the customers.

2 **Time-consuming**
Manually printing and finding the label that needs changing takes a lot of time, affecting workers' overall productivity.

3 **Prone to Human Errors**
During peak hours, workers may commit many mistakes in updating displays, especially the unskilled ones.

4 **High Level of Paper Consumption**
Constant updating of paper displays result in using a lot of paper, which is not beneficial to the environment.

5 **Difficulty in Comprehensive Data Management.**
Current solutions don't have a CMS server that can comprehensively manage data.

SOLUM
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1.1 Information Sharing

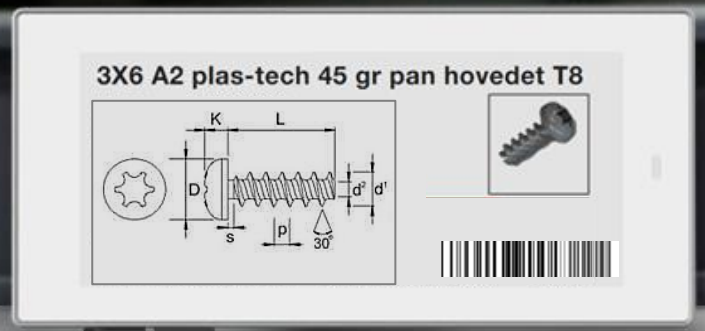
1st page

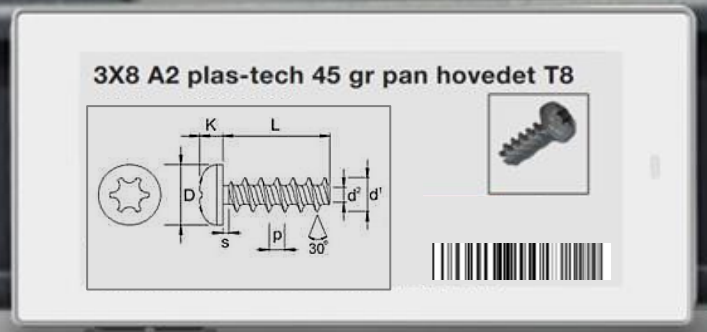
SOLUM
Solution provider.

1.2. Information Sharing

Short press (L or R)

2nd page





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1.3. Information Sharing

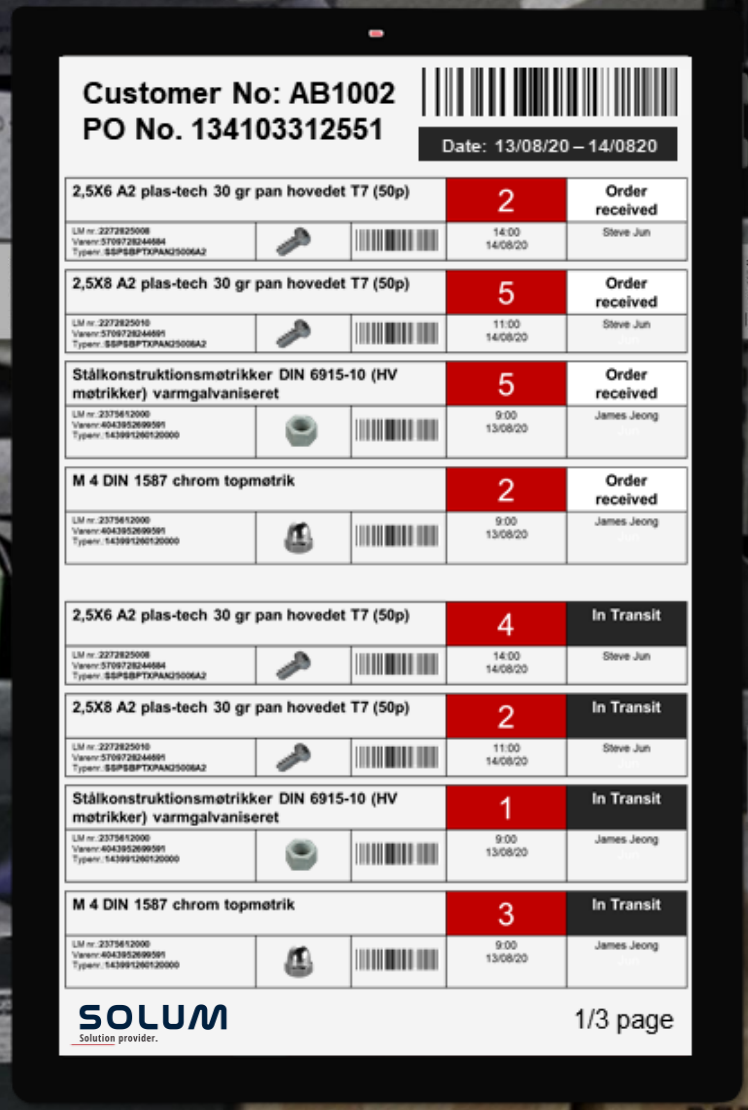
Short press (L or R)

3rd page

SOLUM
Solution provider.

Additional Features for
Any of your solution

1.4. Signage Dashboard (11.6”)



Information Sharing Utilization

1. Price display

Tag size: 2.9″
Real-time synchronization of price on POS and display makes dynamic pricing possible, and virtually eliminates price errors.

2. Inventory display by size

Tag size: 1.6″
Customers can check the stock of shoes or clothes and ask store staff for the product. This increases staff efficiency, and increases customer satisfaction through active information acquisition.

5. Expiration date sharing

Tag size: 2.9″
Display expiration dates in order to avoid the risk of selling expired products.

6. Inventory status sharing

Tag size: 2.9″
List remaining inventory status of goods/parts so they can be ordered immediately when they run low/out of stock.

3. QR code sharing that connects to online purchasing site

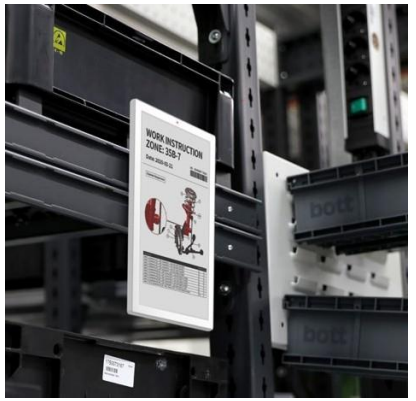
Tag size: 1.6″
If a product is not in stock, customers can connect to the store's online site via a QR code on the display. This expands your sales opportunities even if items run out in-store.

4. Materials display

Tag size: 4.3″, 4.2″
Specify detailed material information (ex: nutrition, ingredients, allergens) of the product or provide additional information on to help it sell (ex: sugar content of wine).

7. Manufacturing work instructions

Tag size: 11.6″
Detailed operation instructions can be displayed on the manufacturing line so that workers can see and work using the display. The manufacturing item instructions and manufacturing process can both fit on one display, which means no more need for printed material.



8. Machine status indication

Tag size: 7.5″
Notice of operation time/status of breakdown/ repair of machinery and equipment & operation precautions.

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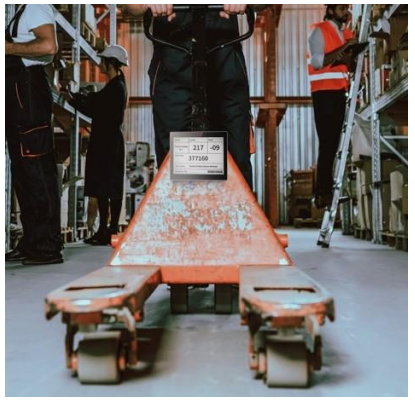
Information Sharing Utilization

9. Product specification display

Tag size: 6.0”
Display of detailed specifications for home appliances, because customers’ active acquisition of information increases satisfaction.

10. Production status display

Tag size: 11.6”
Marking wine/beer/cheese’s production dates, materials, environment (temperature and humidity), progress, inspection date, etc. Comprehensive syste m management is made possible.



11. Sharing information on moving vehicle

Tag size: 7.5”
Information for delivery of goods (status, inventory, etc.) from process A to process B can be displayed on the screen without any need for verbal communication.

12. Sharing information about picking & stocking

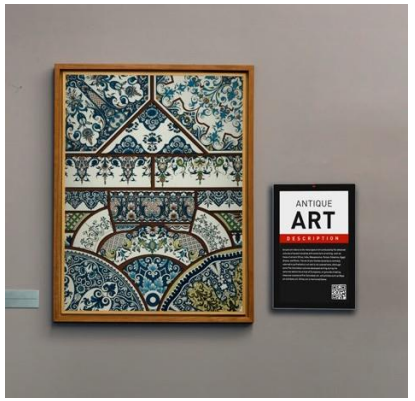
Tag size: 4.3”
Display picker information, order number, picking item, picking list, and status.

13. Delivery information notation

Tag size: 2.7”
Display order number and delivery store information on tray to be delivered from distribution centers to stores. This creates a system, which will help prevent accidents and mistakes in delivery.

14. Sharing information in shared platform

Tag size: 7.5”
Streamlined reservation process allows the sharing of reservations in areas such as conference rooms, offices, and locker rooms, providing convenience to patrons.



15. Art description

Tag size: 7.5”
Deliver voice and customer-required additional information by using QR codes to display descriptions in museums and galleries. This type of convenience means that you only have to update the description of the piece through the ESL manager every time an exhibition changes.

16. Menu description

Tag size: 7.5”
Real-time menu updates & QR codes in restaurants enable customers to participate in events.

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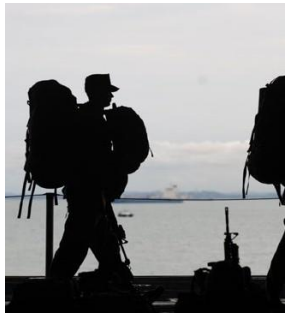
USE CASES

Distribution center

Office

Army



Health care

School

Ship

Factory/Production line

Amusement/Leisure park

Hotel

Kindergarten

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USE CASES

2

INDUSTRIAL USE CASES

Pick-by-light

Installed on each box, ESLs feature a blinking LED light that can be activated to indicate the position of the material on the shelf, thereby making it pushing the picking button, the pick procedure to the next box.

With Pick-by-Light technology, you'll be able to experience easy and transparent inventory management, elimination of mistakes and costly returns, increase in productivity and speed, plus real-time update of stock information.

USE CASES

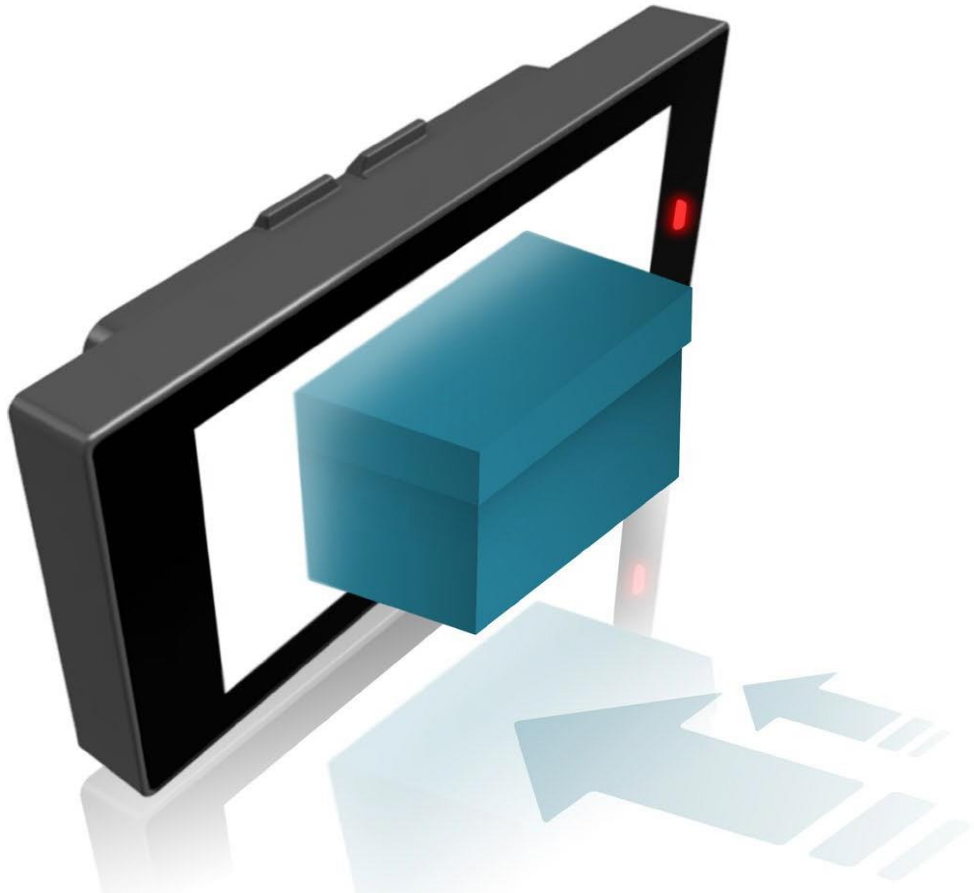
PICK-BY-LIGHT

A hands-free solution for quickly and easily finding items that need to be picked. Functions along with LEDs and confirmed by buttons.

Retail
Pick-by-light allows staff to locate and pack a customer's orders after they've created a virtual shopping list on the store's website.
The customer then visits the store to collect the packaged items.

Distribution Center
In distribution centers, the picking operator collects items from warehouse shelves and packs a customer's order. The package is then delivered from the warehouse to the client, which could either be retailers, wholesalers, or direct consumers.

Production Line
In a factory production line, the operator can easily locate parts for assembly inside the inventory room with the help of LED signals. This collection may be done prior to, or in the middle of, the manufacturing procedure.



Traditional Solutions

1. Using a PDA, pickers and staff check a customer's virtual order list
2. The location code of each product is checked, and staff go to each location
3. Staff compare the UPC of the goods and the UPC on the PDA, then take the product after confirmation
4. Staff scan each barcode using the PDA, and place items in a packaging box
5. Staff then scan the barcode on the box

Problems with Traditional Solutions

1. **Difficulty locating items**
Unskilled workers and new hires often have difficulties finding the exact location of items as well as the location of the shelves using the location code on the PDA.

2. **Time-consuming**
It is necessary to check the UPC of the item to confirm if the item you picked is the one listed on the PDA. An inexperienced worker may spend a lot of time comparing UPCs of goods with UPCs on PDAs.

3. **Lots of errors**
Even skilled workers make a lot of mistakes because they have to scan barcodes one by one according to the quantity of goods. In addition, barcode recognition performance varies from PDA to PDA. so it is difficult to read if it is an old barcode. It can also cause delays in all tasks.

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Problems of wired solution

Expensive initial installation costs
The installation of the entire system costs a lot since all machines and shelves are connected by wires.

Limited flexibility
Flexibility is limited because all shelves and labels are connected by wires -> This is not appropriate in situations where layout changes a lot or shelves need to be moved.

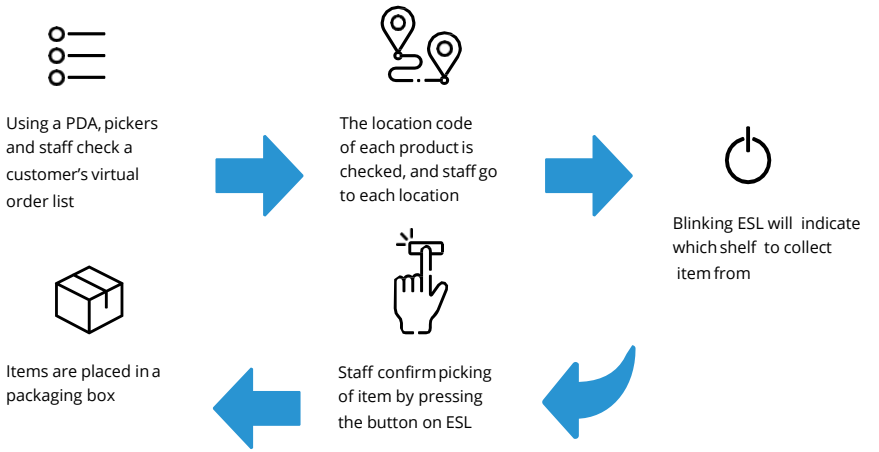
Problems of wireless solution

High PDA dependency
Common wireless solutions are highly dependent on PDAs, which are prone to human errors.

Low battery time
Competitor ESLs have a life expectancy of five years. But frequent use of LED blinking and other features will cut the battery life in half.

What do we do differently?

Process of Newton Pick-by-Light



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ESL Solution for
Distribution Center

2. Newton Sub-Giga 4.3” Pick by Light

SOLUM
Solution provider

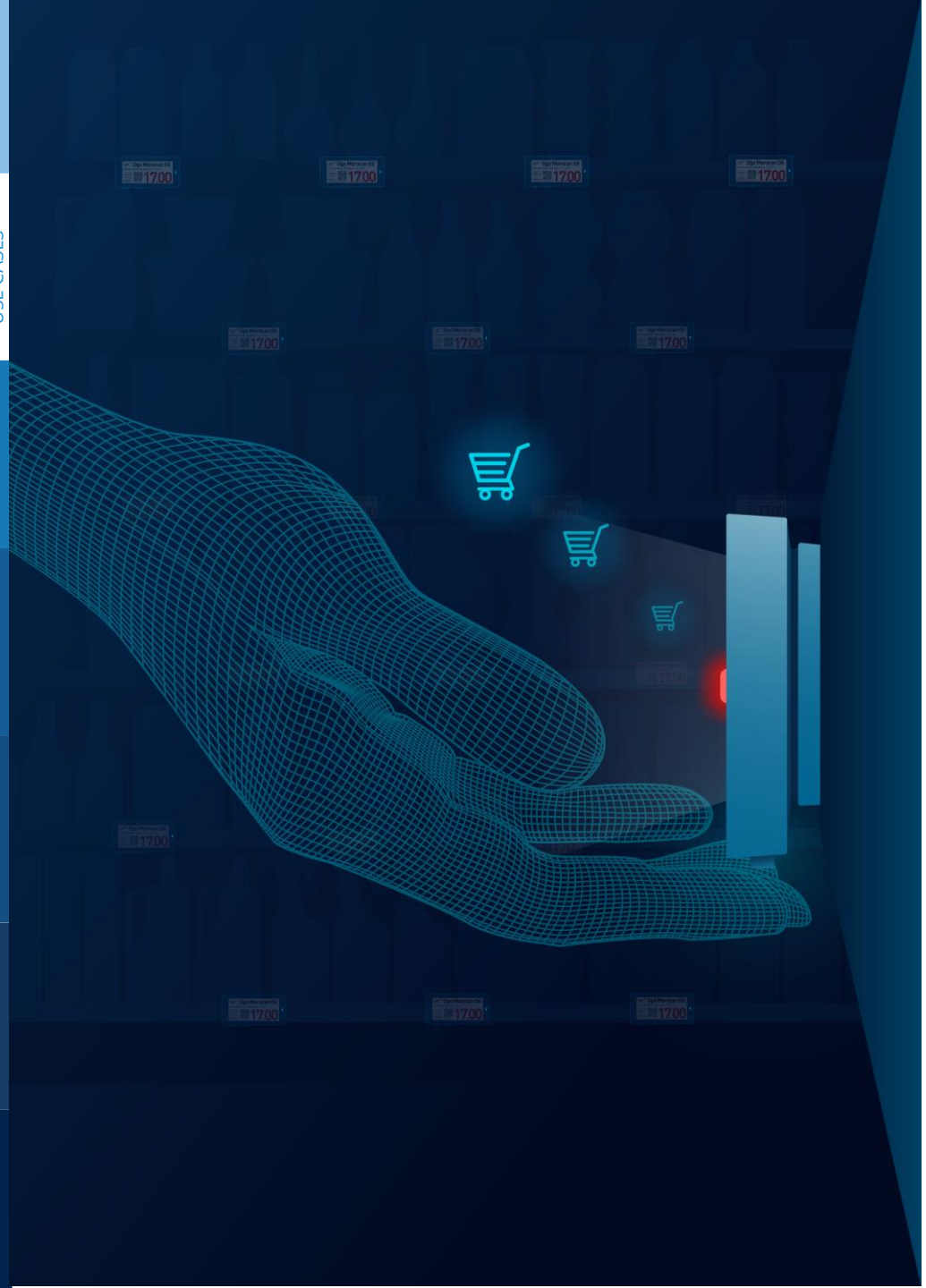
Additional Features for
Any of your solution

2. Put by Light – Stock Refill

SOLUM
Solution provider.

ESL Solution for
Distribution Center

2. Newton Sub-Giga 4.3” Pick by Light with 4.2” Tote Label



3

INDUSTRIAL USE CASES

Smart ordering

Operators can simply push a button on the ESL to generate and automate the re-ordering

So with the help of a single action, you will enjoy easy and transparent inventory management, reduction or even elimination of backlogs, and real-time update of stock information.

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3.1. Smart ordering with buttons

Long press (L, R or Both)

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3.2. Smart Ordering by Barcode Scanning

Ordering or check-out counting

New hardware circuit has to be developed

4

INDUSTRIAL USE CASES

Trolley tracking

ESLs serve as digital routing slips for internal transport, following the delivery process from parts selection to assembly. These products are assigned with an MES / ERP system and categorized into Part, Semi-goods, Finish Goods.

Trolley Tracking capability allows for easy and real-time control of parts, plus the automatic registering of incoming and outgoing goods.

5

INDUSTRIAL USE CASES

Roaming solution

Similar to Trolley Tracking but instead of within one warehouse, digital routing slips track trolleys moving from Plant A to Plant B,

It enhances long-distance trolley tracking as well as the registering of incoming and outgoing goods.

Instead of the piles of paperwork needed to monitor good moving between plants, Roaming Solution stores data digitally, reducing paper consumption altogether.

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6

INDUSTRIAL USE CASES

Equipment management

ESLs digitally display essential equipment information (ex. date of procurement, current stock count, capabilities, etc.) which helps control ov er inventory.

With the NFC tagging feature, a last / next technical check may also be implemented.

In essence, investing in SOLUM ESL is investing in management as well as real-time, accurate inventory updates.

7

INDUSTRIAL USE CASES

Manufacturing instruction

Warehouse employees are equipped with clear manufacturing instructions or planned daily production or activity which can be accessed from the ESLs themselves.

Digitalization of procedures means reduced paper consumption, which not only helps in reducing your environmental impact but also in improving your company's brand image.

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8

INDUSTRIAL USE CASES

Job instruction

ESLs mounted on the product in the line display real-time changes in the instructions, which are controlled from the main server. This gives workers at the line clear task instructions

Simultaneously, supervisors are able to track

Digitalization of job instructions not only helps present data in real-time, but also minimizes human errors related to the distribution of job-related information.

9

INDUSTRIAL USE CASES

Work manual

With the use of ESLs, paper working manuals are made irrelevant, since instructions can be displayed on ESL screens directly.

What does that entail? Reduction of labor involved in production and assembly, as well as making that information easily accessible to employees, without the need for using printed resources.

USE CASES

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ESL Solution for
Distribution Center

Newton 4.2” Tote Label for equipment management, job instruction

Aims SaaS

Advanced Information Management System

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Aims SaaS
Cost Saving

With Aims SaaS, you can stay focused on your business while our experts ensure a frictionless operation.

Hosted on Cloud Platform using Microsoft Azure , Aims SaaS allows businesses to deploy Aims more quickly at a lower cost. Just put the hardware in place, subscribe to Aims SaaS, and you're good to go.

Aims SaaS also ensures stability and optimum performance all the time by scaling the server automatically and is bolstered with all the security controls to protect your business data from any potential threats.

Features

Aims SaaS comes with all the features you need to digitize your business efficiently

- High availability and load balancing for uninterrupted operations
- Scalable resources for maximum cost efficiency
- Multi-tenant architecture for fast label update performance
- Real-time deployment of new features and services
- Continuous performance and history check

99.9% Uptime

Deployed across +3,000 stores

Up to 78% in Cost Savings

1 million image generation with in 5 minutes

24/7 SLA Availability

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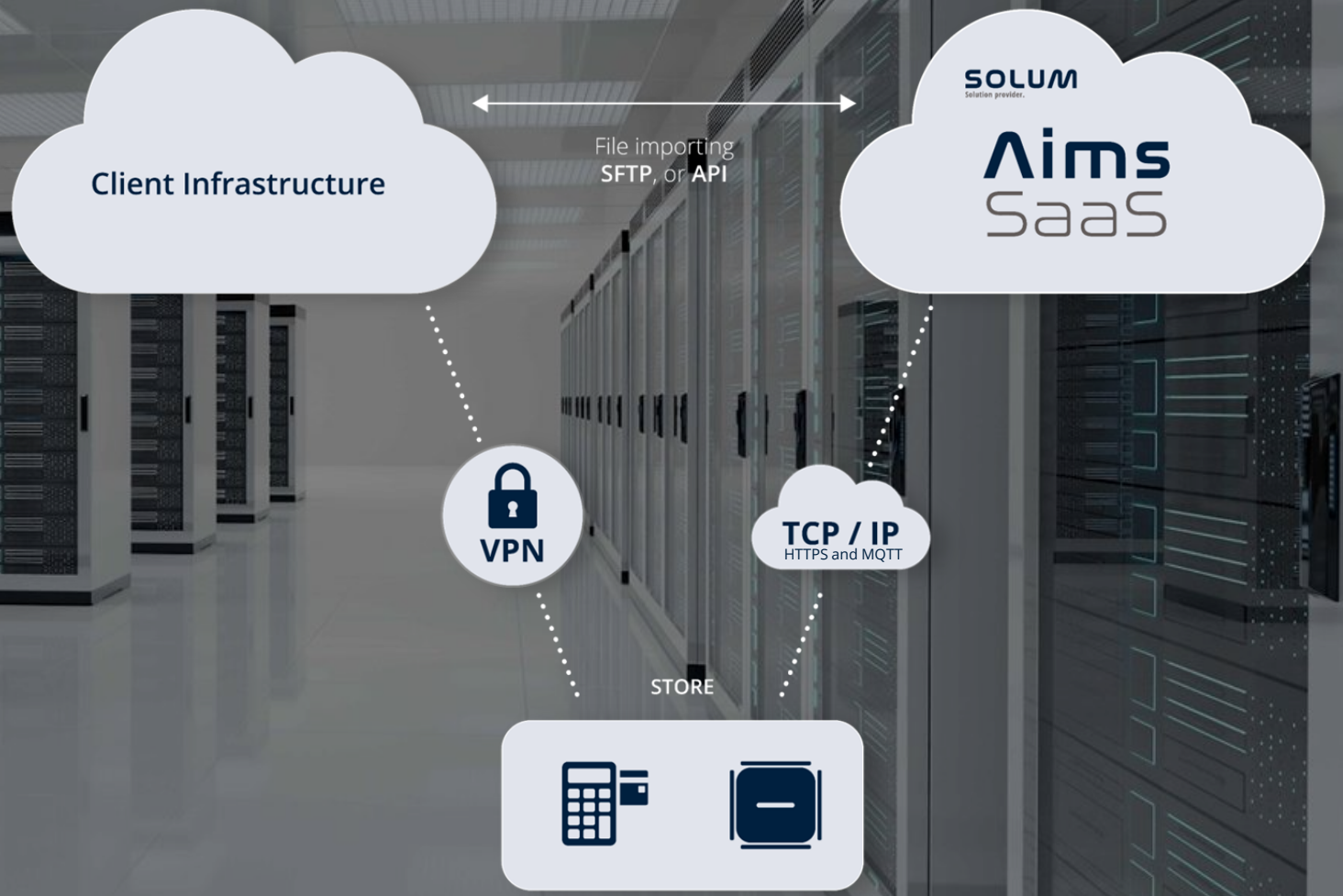
Aims SaaS
Integration & Compatibility

How Does Aims SaaS Work?

SOLUM AIMS SaaS can be integrated with any kind of client ERP platform (public cloud, private cloud/data center or a store server).

Aims SaaS is not requiring a particular infrastructure for Cloud communication and just simply operated with a standard SOLUM Newton Gateway.

“HTTPS” and “MQTT over Web Sockets” using security tokens known as Shared Access Signature (SAS) tokens over TLS/SSL are used between AIMS SaaS and SOLUM Newton Gateway.



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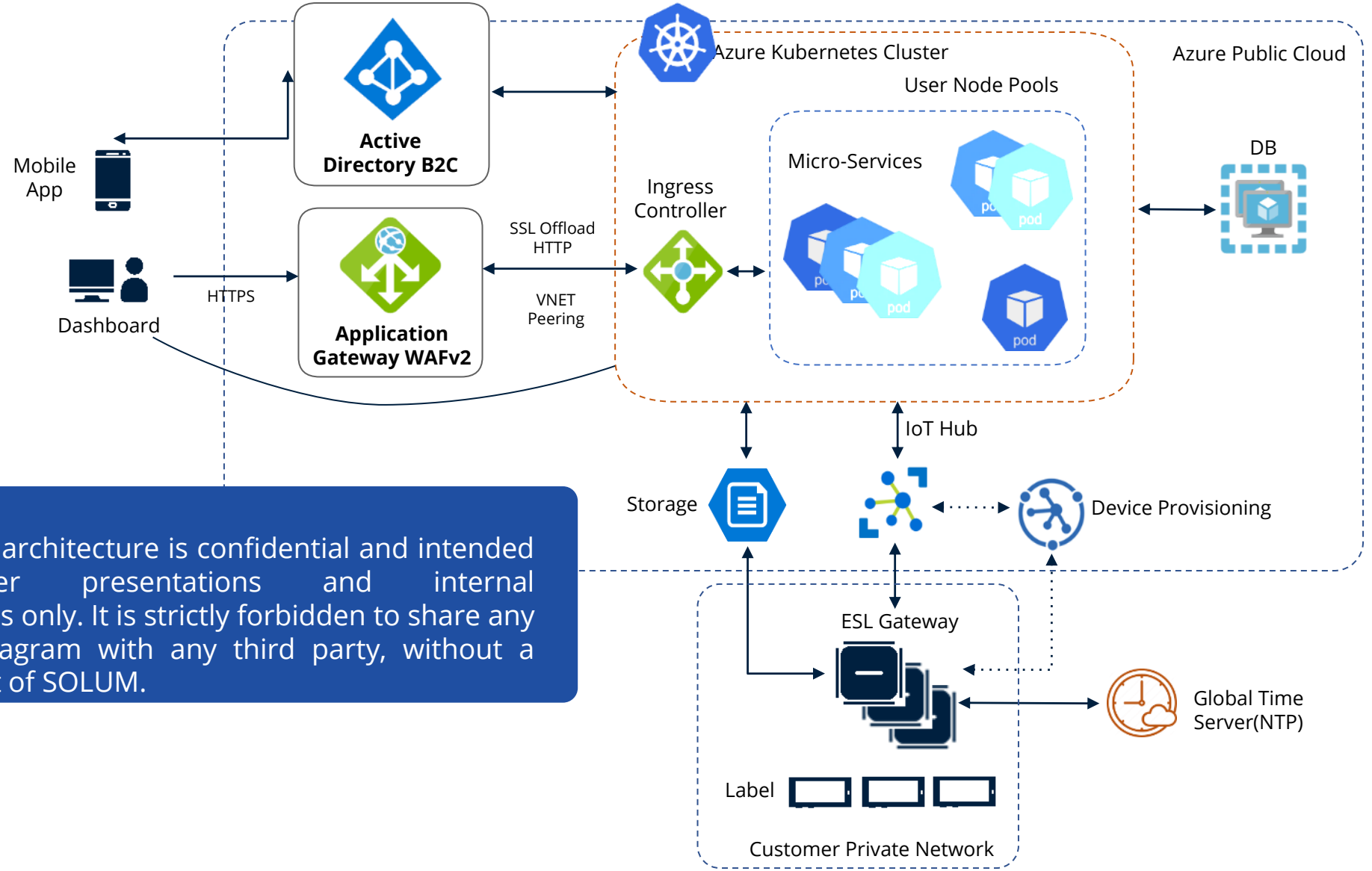
Aims SaaS
System Architecture



This Aims SaaS architecture is confidential and intended for customer presentations and internal communications only. It is strictly forbidden to share any part of this diagram with any third party, without a written consent of SOLUM.

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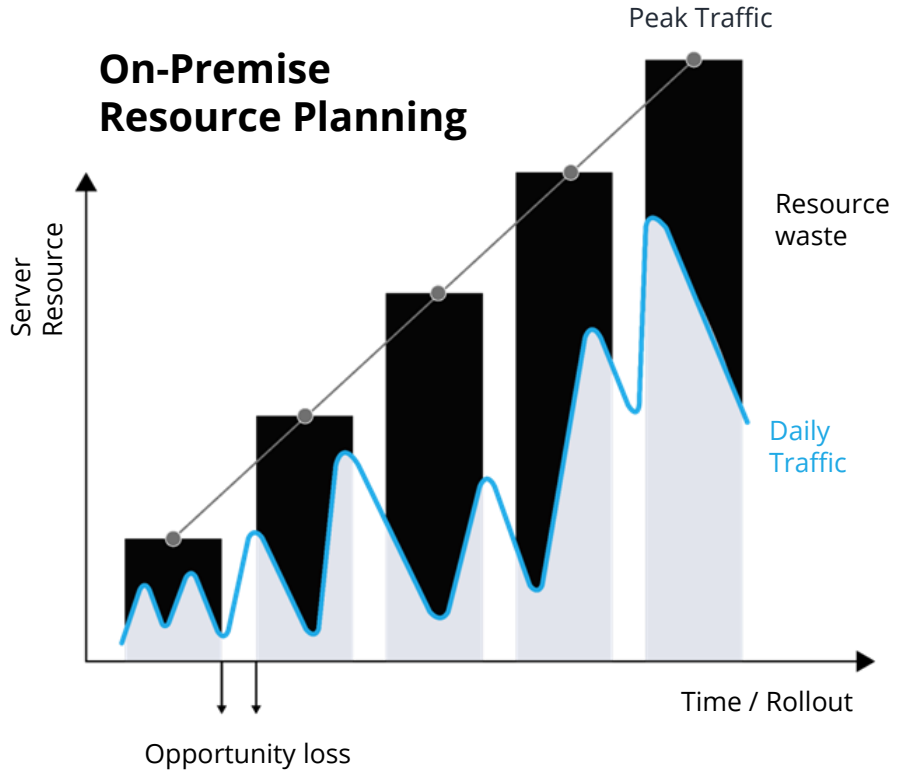
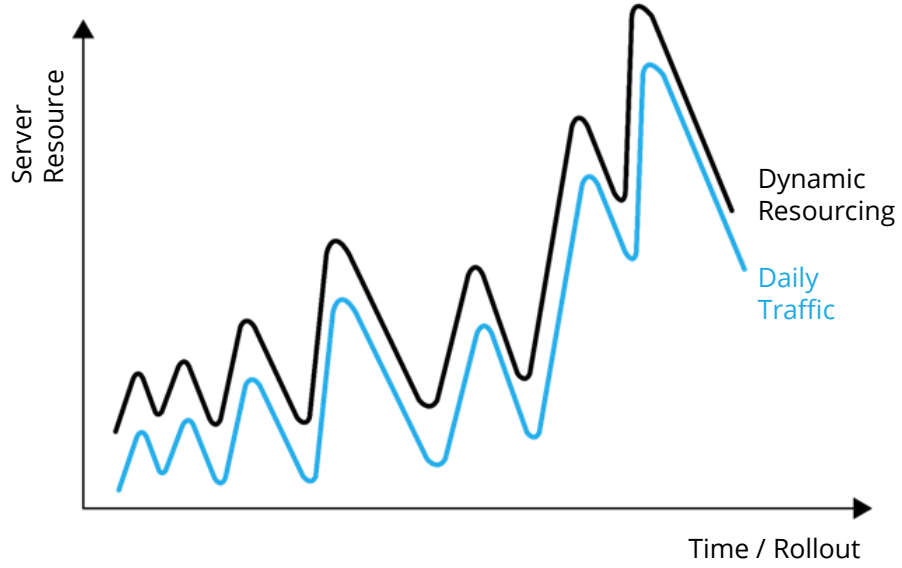
Aims SaaS
Automatic Scalability

On-Premise Resource Planning



In an on-premise server architecture, customers buy the server hardware that reaches maximum capacity when there's a peak traffic. However, in reality, the daily traffic is far lower than its peak traffic much more often. Therefore, there will be many underutilized server capacity which translates to resource waste. Besides, there is an opportunity loss of ESL benefit from the delay of the ESL roll-out deployment while it's scaling up the server hardware in an on-premise infrastructure.

SaaS Dynamic Resourcing



With Aims SaaS, there is no waste or loss of resource or opportunity as we scale up and down our server resources automatically depending on the daily traffic. As a result, you will just have to pay the minimum amount of subscription fee as your resource usage decreases.

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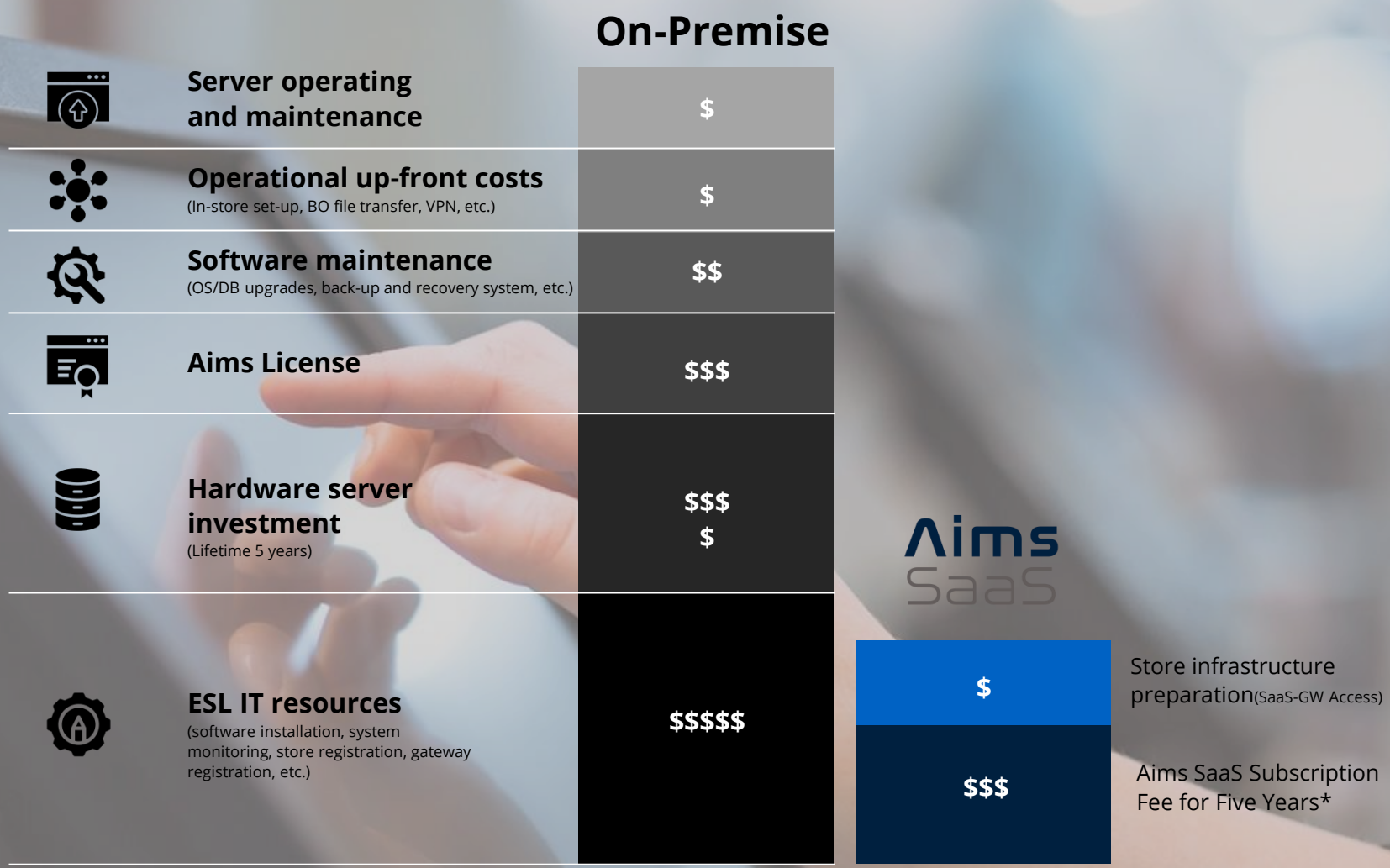
Aims SaaS
Cost Saving

With Aims SaaS, the cost of software can be spread over time and, as it is hosted in the cloud, the upfront implementation costs (e.g. CAPEX) are significantly lower than with more traditional methods.

On-premise software and SaaS can have significantly different long-term costs. By examining how these costs are determined, you can identify major savings

On-Premise vs Aims SaaS Cost Chart



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Aims SaaS
Quick Implementation

With SaaS based software, it is very much possible to deliver value to the business - way sooner than they had previously imagined. Through effective customer planning, user training, and coordination with all the stakeholders, a faster SaaS implementation can be achieved **in just 10 minutes** versus **7-12 days of implementing an on-premise software.**

The subscription model of Aims SaaS means you just have to pay the subscription fee - no need to install and configure individual machines and 3rd party cloud environments. The only infrastructure needed are our own Newton Gateway and the labels. We also coordinate closely with our clients to understand their specific needs and therefore facilitate a smooth, shorter implementation of the system.

Faster time to market means improved operations and additional competitive advantage for your business.

On-premise implementation time:

Hardware setup

5~10 days

Software
Installation and test running

1~3 days

Aims SaaS implementation time:

Account Creation

10 minutes

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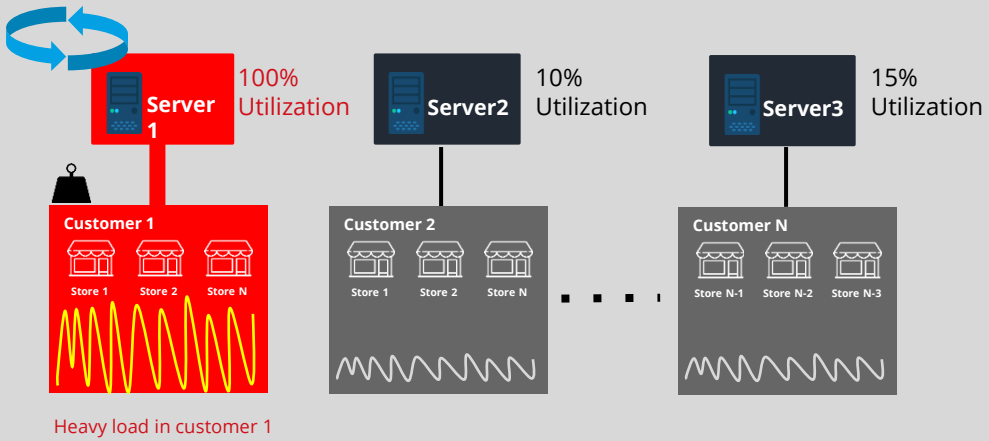
Aims SaaS
Performance Comparison

On-Premise

Single-tenant architecture in an on-premise server faces the risk of reduced performance when there is heavy traffic. The primary reason is that its Application / DB server only has a fixed capacity to process all the customer traffic at the same time.

In an assumption that all the customer's traffic happens simultaneously, while one server utilizes its capacity fully, there are often other servers that are just sitting and not utilized at all.

$$\text{Processing time} = \frac{\text{A load in a customer}}{\text{Performance of APP/DB X 1}}$$

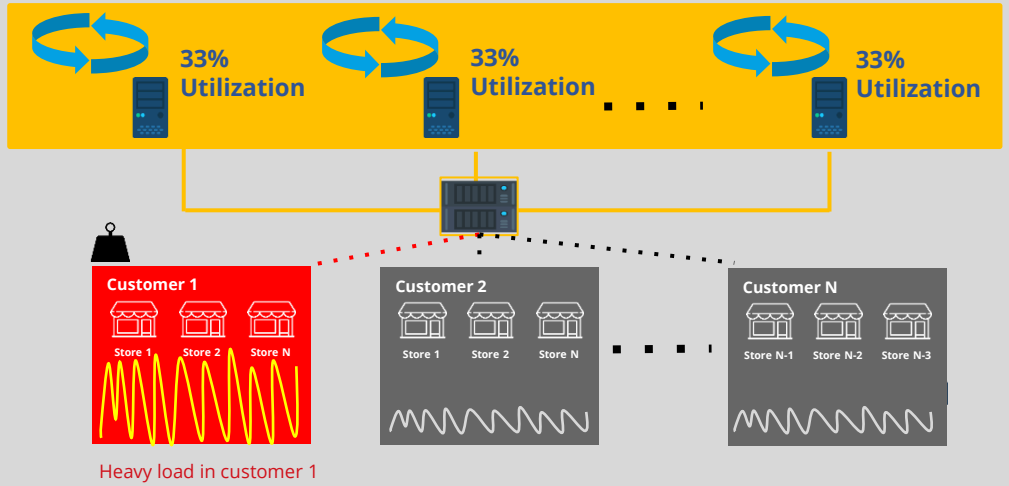


Aims SaaS

On the other hand, Aims SaaS multi-tenant architecture is the perfect way to guarantee a high performance standard at all times. Even when there is heavy traffic on the customer side, all servers work together to process the load, thus resulting in a shorter processing time than single-tenant architecture while not wasting any resources as well. Even though there is heavy traffic in all customers, there is no concern as the Dynamic Resourcing feature of Aims SaaS scales automatically to handle peak loads in real-time.

The multi-tenant architecture of Aims SaaS guarantees high performance standard. This helps make **Newton the fastest ESL system in the world**!

$$\text{Processing time} = \frac{\text{A load in a customer}}{\text{Performance of APP/DB X } \mathbf{N}}$$



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Aims SaaS
Service Status

Service	On-Premise Server	Aims SaaS Server
Server Hosting (Scaling, Monitoring, and Maintenance)	Client	SOLUM
Software Installation	Client	Not Required
Server Hardware Cost	Client	Not Required
Server Hardware Maintenance	Client	Not Required
Data Security and Backup	Client	SOLUM
ESL System Management and Monitoring • Software installation and upgrades • Store registration and deletion • Gateway registration, deletion, configuration & upgrades • Status monitoring of Software, Gateway and Labels	Client	SOLUM or Client
Hotline service availability (Level 1 support - store-based operation support)	Not Available	Available
Server Level 2 & 3 Support (Support for IT Department)	SOLUM	SOLUM
Service Level : Resolution Time	Resolution is only available after DB access permission is given to SOLUM	Resolution can be done right after a failure report is given to SOLUM

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Aims SaaS
Reliability

High available systems are reliable in the sense that they continue operating even when critical components fail. They are also resilient, meaning that they can simply handle failure without service disruption, data loss and seamlessly recover from such failure.

Powered by Microsoft Azure, the Aims SaaS provides businesses with high availability and load balancing to handle the most demanding enterprise workloads, as well as support global expansion.

Through auto-scaling criteria and resource monitoring features, Aims SaaS minimizes the redundancy in the production environment and ensures high performance even in the peak hours.

These features ensure that the system is always stable and runs at optimum efficiency, reducing or preventing losses due to Service Level Agreement (SLA) violation penalties.

- 99.90% Uptime

- 4 hours recovery time

- 24/7 SLA Availability

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Aims SaaS
Mobility and Collaboration

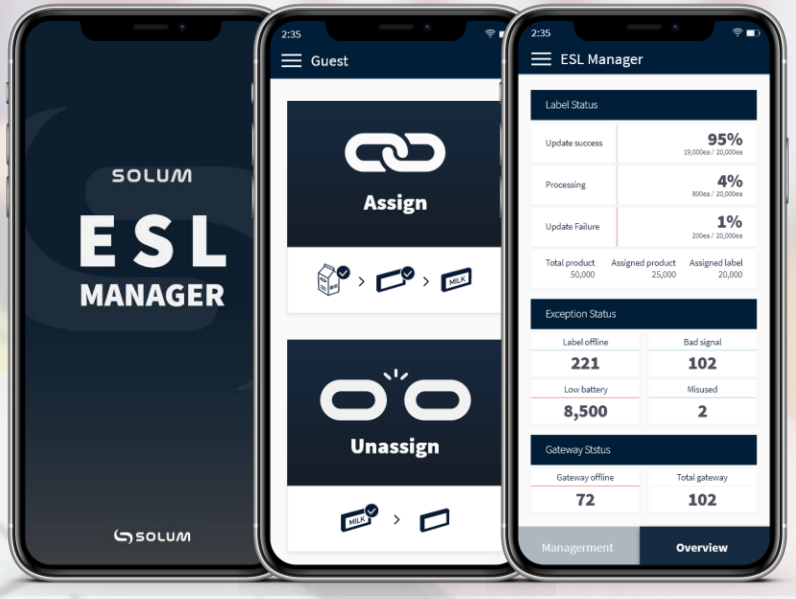
The right software deployment model can empower your employees to work more efficiently, by providing them with time-saving features. This extends to how simple it is to use the software on mobile devices.

Many on-premise solutions require a VPN or custom-built mobile app for the software to work on mobile devices.

By contrast, Aims SaaS works on any web-enabled device.

Also consider how better scalability
and deployment time might affect productivity.

PDA(Android)



Mobile(Android/iOS)

According to IDC's survey, organizations that host their application workloads in the cloud found that it contributed to a 23% productivity improvement for their employees.

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Aims SaaS
Guaranteed Data Security

IDENTITY MANAGEMENT
- Authenticated and allowed access based on Microsoft Azure Active Directory
- Seamless and Secure access to the data to deliver effortless experience

API AUTHENTICATION AND AUTHORIZATION
- Different permission levels can be provided for different users.
- Continuously authenticate API calls registered users
- track users' requests - to block or throttle any request base on levels

APPLICATION DELIVERY CONTROL
- Secure Sockets Layer termination
- End-to-end SSL/TLS encryption protocols
- WAF_v2 (by Azure) - Centralized protection

PRIVACY
- All information stored on Azure storage and Azure SQL Database.
- Both encrypt data at rest by default using Azure Disk Encryption

LOGGING AND AUDITING
- All logging data is stored on the internal location.
- Retention period is configurable to ensure compliance with data protection laws.

BACK UP RECOVERY
- Postgres SQL and MongoDB Atlas backup with recovery point objective of 6 hours.

SOLUM invests significantly in security, backups, and maintenance, ensuring that all business data is secured 24/7 from potential threats and attacks.

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Aims SaaS
Security Certifications

The security and privacy of your data in our cloud-based technology is an absolute priority for us. SOLUM guarantees you excellent service, unconditional security for your data and outstanding quality of
our systems as proven by renowned test procedures and certificates.

- **CSA-STAR**

Aims SaaS is CSA-STAR certified.

- **ISO9001**

Our SOLUM Headquarters in Korea is ISO9001 certified.

- **ISO27001**

SOLUM fulfills the ISO 27001 certification of information security controls for any kind of digital information.

- **ISO27017**

SOLUM fulfills the ISO 27017 certification of information security controls based on ISO/IEC 27002 for cloud services.

- **GDPR**

The GDPR (General Data Protection Regulation) was developed to strengthen and standardize data protection for individuals in the EU. SOLUM is 100% DSGVO-compliant and treats all your data securely and confidentially.

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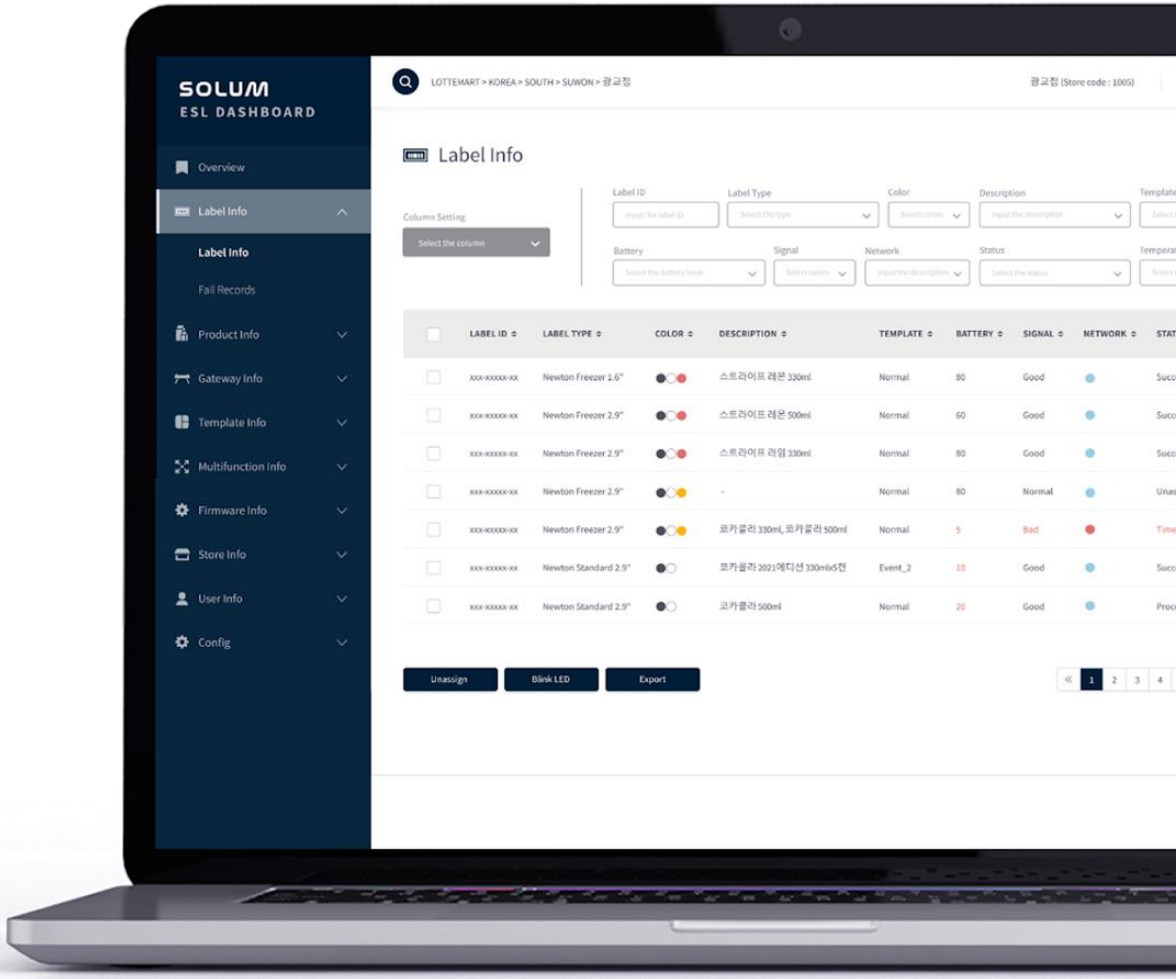
About SaaS
APIs Customized Functionalities

Aims Dashboard and Aims Manager App
can be fully customized to specific requirements.
Purpose-driven APIs can be integrated to extend
the functionality of Aims.

Multiple solution modules to activate APIs for the following use cases

- **Waste Prevention**
- **Product Navigation**
- **Pick-by-Light and Stock-by-Light**
- **Dynamic Pricing (Store level possible)**
- **Out of stock solution(Newton's button)**



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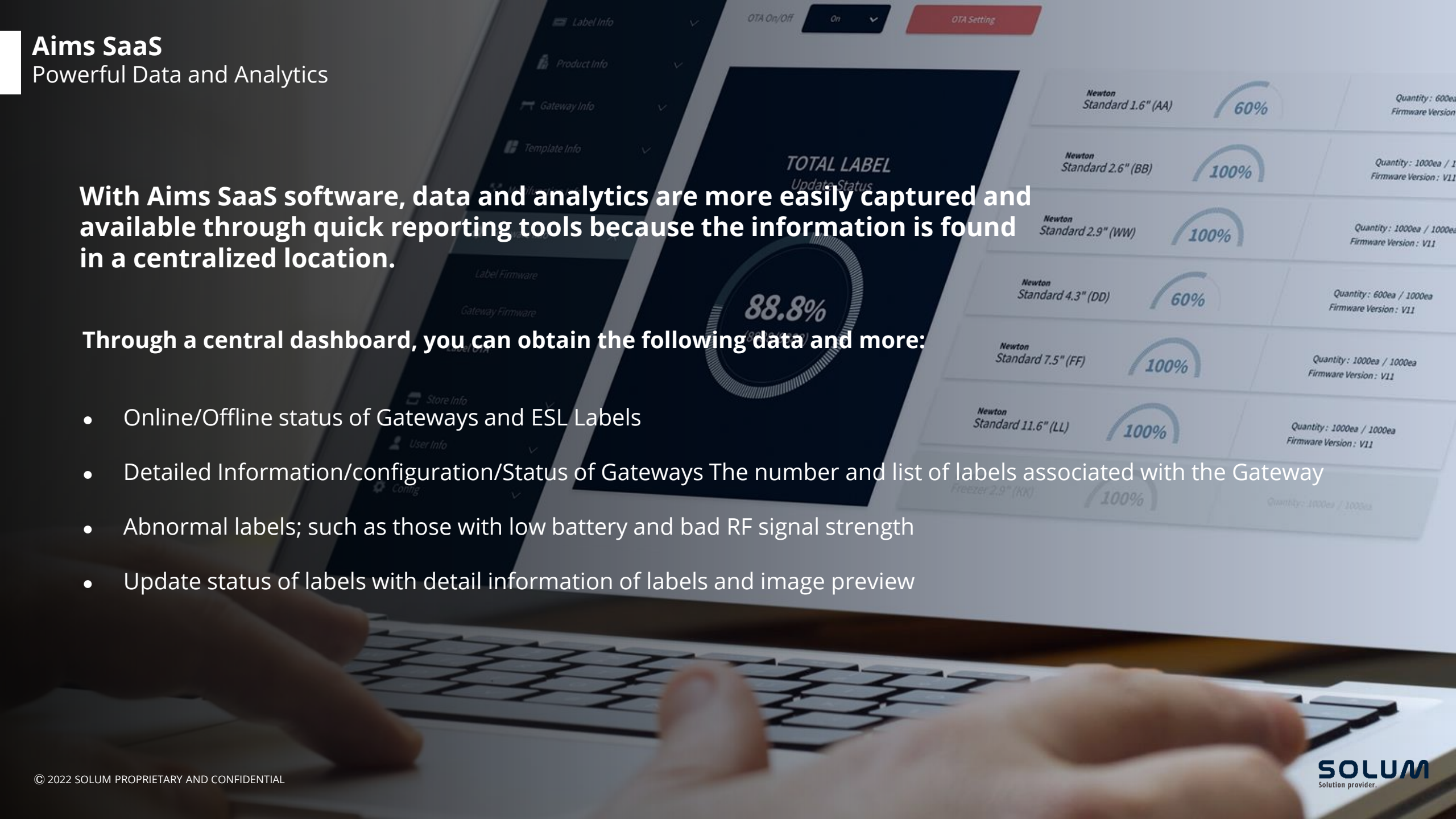
Aims SaaS
Powerful Data and Analytics



With Aims SaaS software, data and analytics are more easily captured and available through quick reporting tools because the information is found in a centralized location.

Through a central dashboard, you can obtain the following data and more:

- Online/Offline status of Gateways and ESL Labels
- Detailed Information/configuration/Status of Gateways The number and list of labels associated with the Gateway
- Abnormal labels; such as those with low battery and bad RF signal strength
- Update status of labels with detail information of labels and image preview

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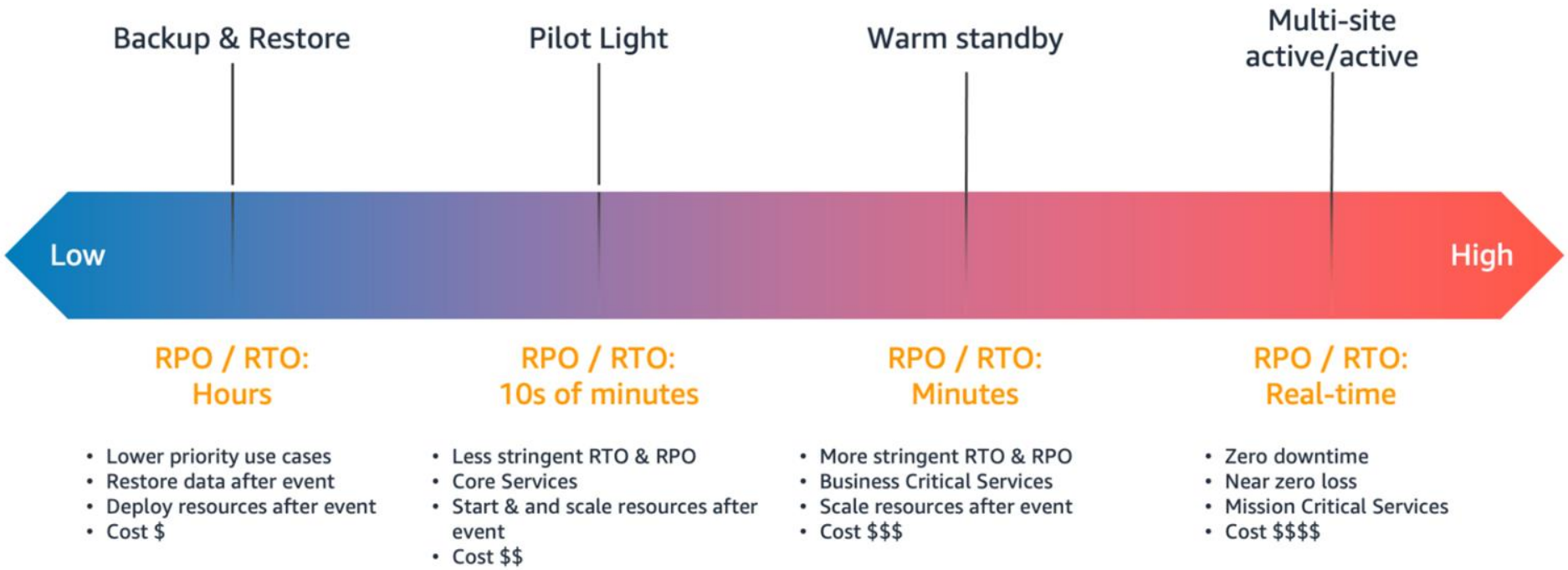
About SaaS
Disaster Recovery

Disaster recovery strategies available to you within Aims SaaS can be broadly categorized into four approaches, ranging from the low cost and low complexity of making backups to more complex strategies using multiple active Regions.

For a disaster event based on disruption or loss of one physical data center for a well-architected, highly available workload, you may only require a backup and restore approach to disaster recovery. If your definition of a disaster goes beyond the disruption or loss of a physical data center to that of a Region or if you are subject to regulatory requirements that require it, then you should consider Pilot Light, Warm Standby, or Multi-Site Active/Active.



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Customer Reference of SOLUM SaaS

Our customers trust SOLUM as their solution provider of ESL systems.

By choosing us, we deliver them a SaaS solution that perform beyond their expectations.

ALDI

DOUGLAS

ROGERS

SAMSUNG

MIGROS

IKEA

ROSSMANN

AliExpress

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About SaaS
Specification Sheet

Items	Aims SaaS
Scalability	Automatic scalability
Capacity	Unlimited and flexible
SLA 24/7	Included
Performance (image generation)	1 million within 5 minutes
Multi-tenant (economies of scale)	Yes
Single Sign-On	Yes
Data Lake	EFK (Elasticsearch, FluentD and Kibana)
Cloud Service Provider	Azure
Security & Backup	Yes
Uptime	99.90%
Recovery Time	4 hours
Certification	ISO9001(HQ), ISO27001, ISO27017, GDPR, CSA-STAR

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THANK YOU

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