Statistical Design for Internal Service Performance Measurement

PRC Technical Conference

UNITED STATES POSTAL SERVICE®

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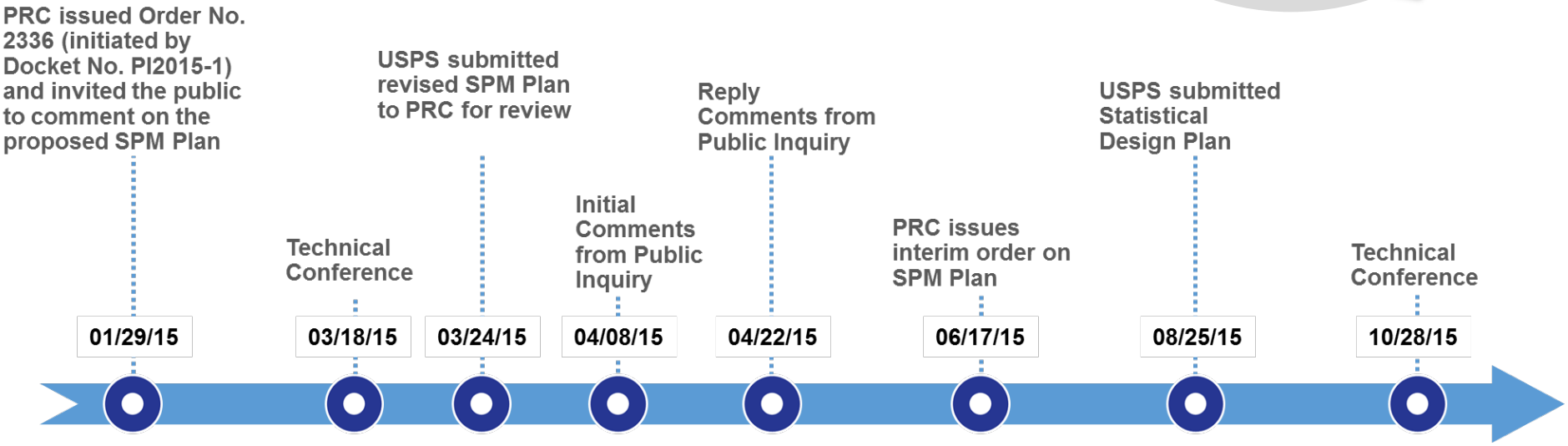
October 28, 2015

Agenda

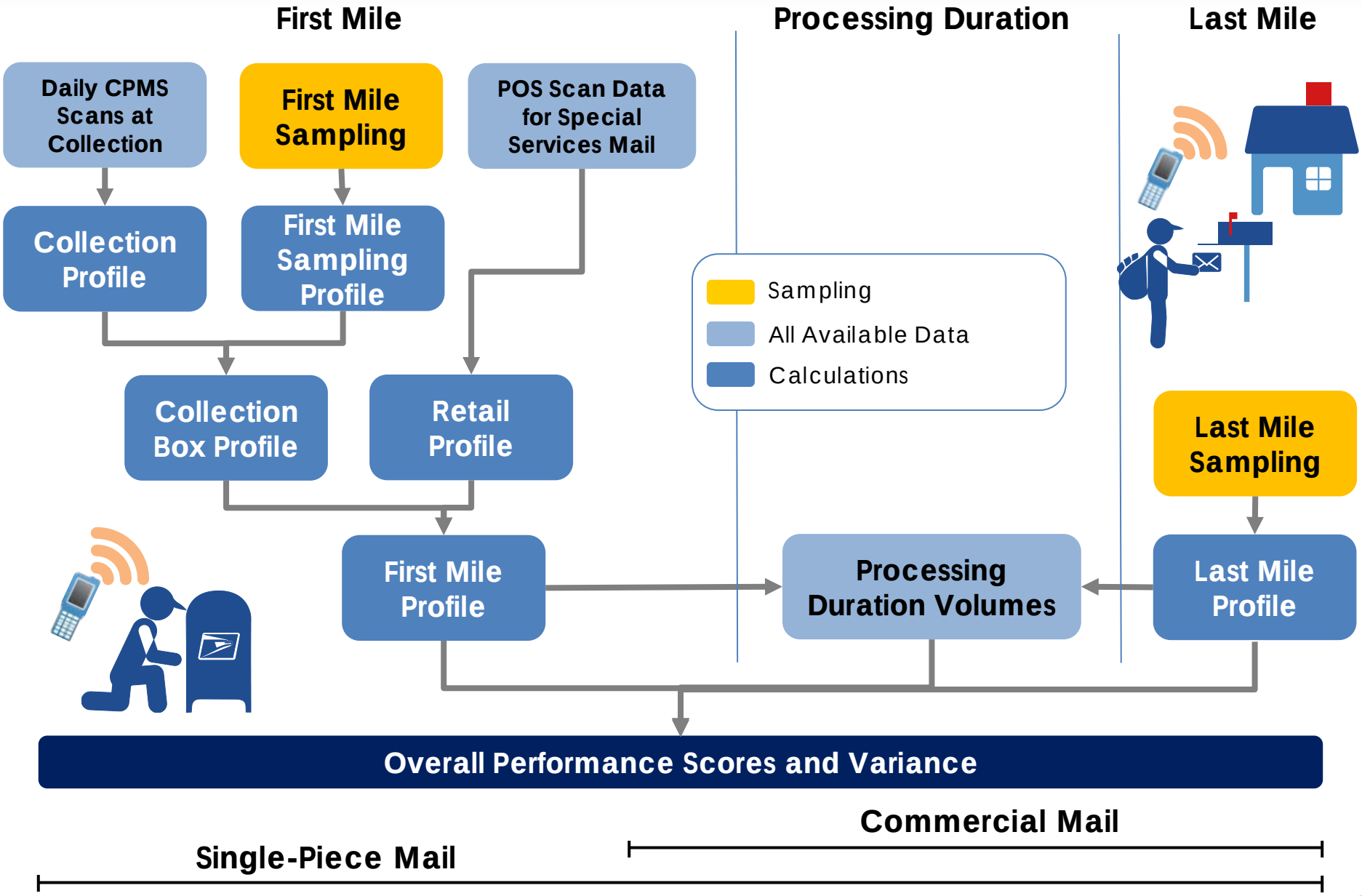
- Background
- Overview
- First Mile Measurement
- Processing Duration
- Last Mile Measurement
- Overall Service Performance Calculation

Internal Measurement *through* Informed Visibility

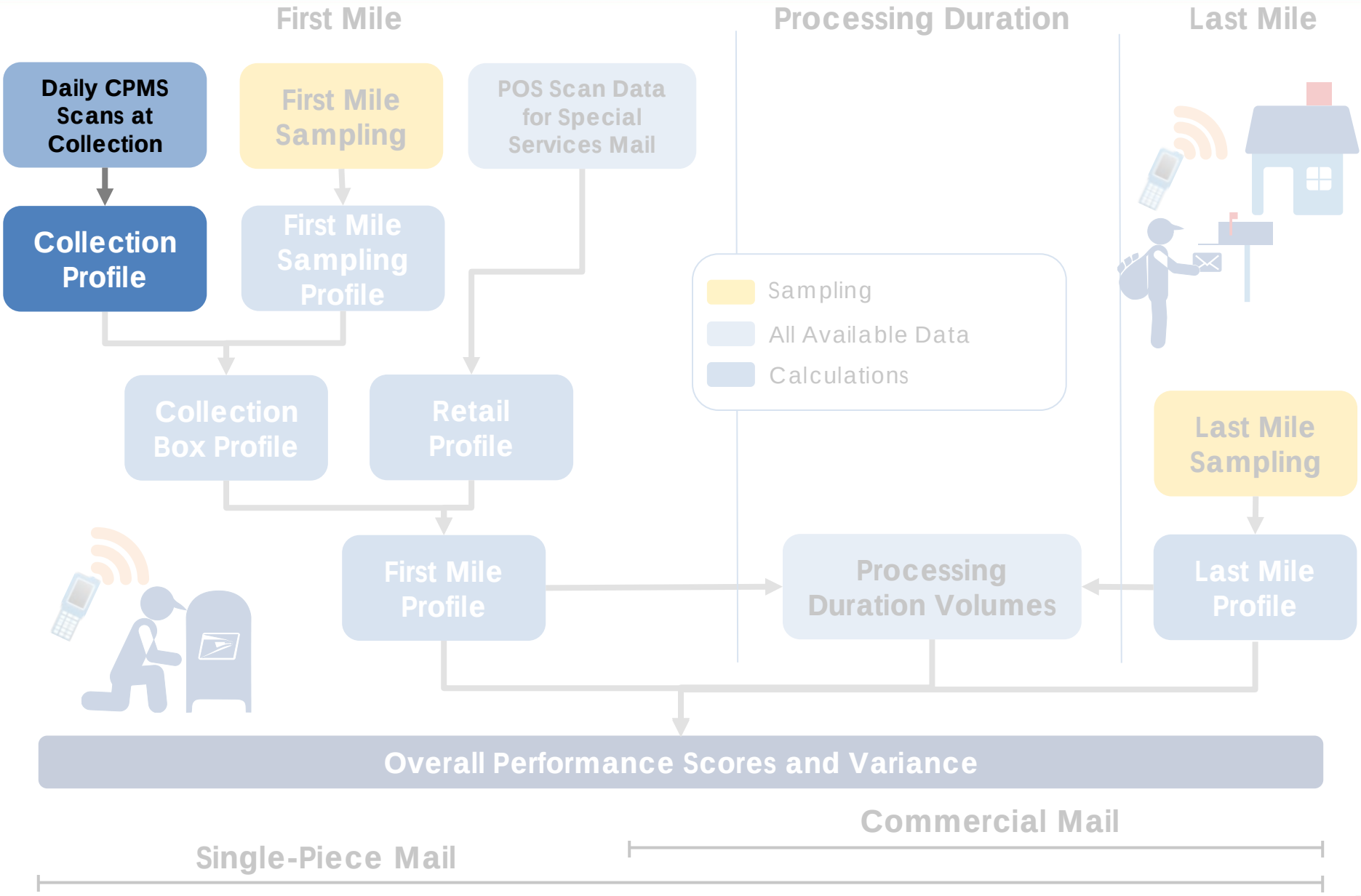
On January 29, 2015, the Service Performance Measurement (SPM) Plan was published through the Postal Regulatory Commission (PRC) for public comment



Service Performance Measurement



Service Performance Measurement



First Mile Collection Profile

Daily CPMS Scans at Collection → Collection Profile

Collection Point Scanning (CPMS Barcode) will be used to create First Mile Collection Profile

- CPMS Scans will be used to calculate whether the full expected density was collected
  - Scan Time compared to Scheduled Pick-up Time
  - Density volumes from annual density tests
- Accounts for early and missed collections

First Mile Collection Profile

Daily CPMS Scans at Collection

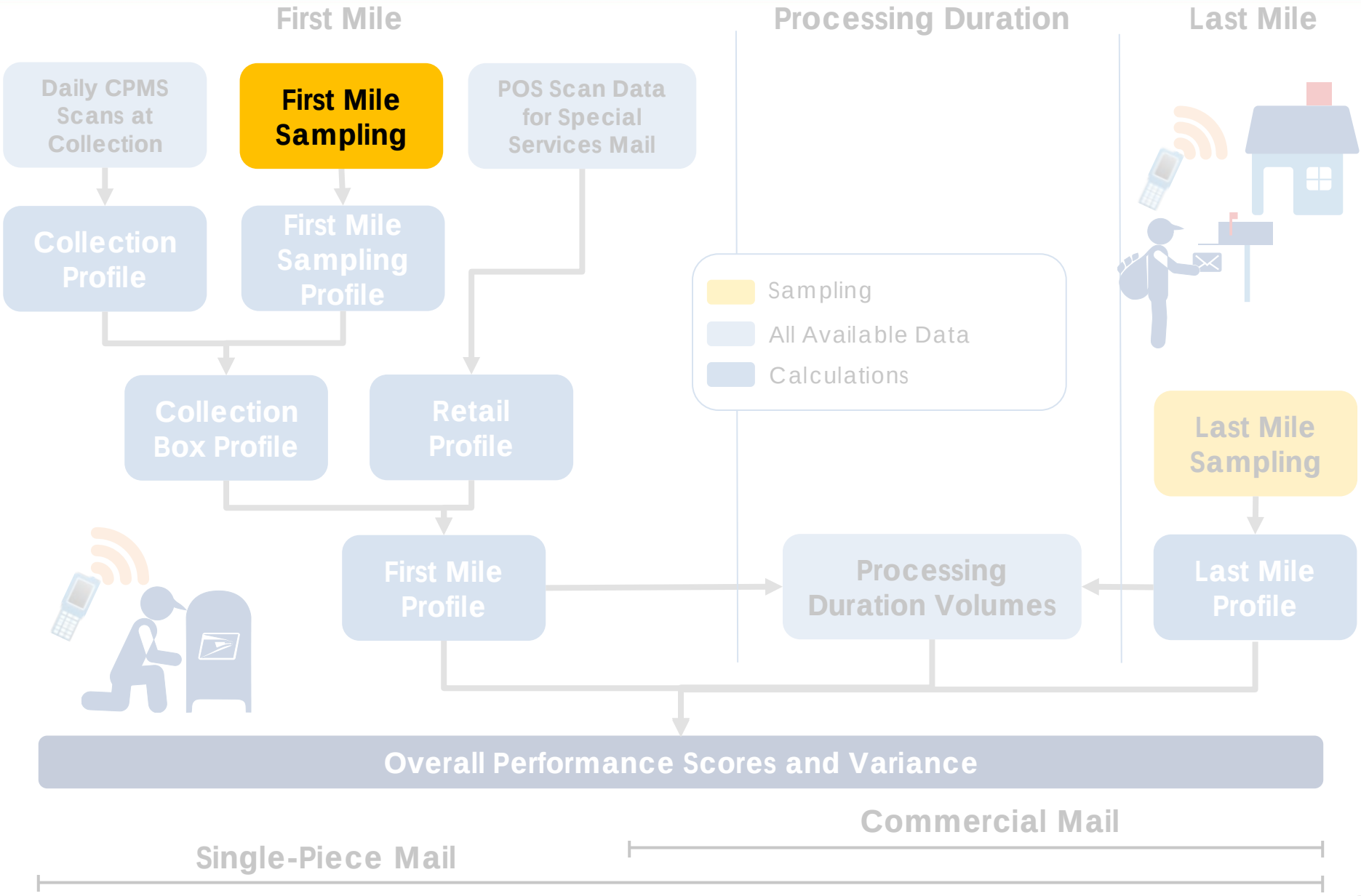
↓

Collection Profile

Density Testing measures average volume of a collection point

- The density test process:
  - Uses an actual count for letters or records a linear measurement of letters contained in the box
  - Converts linear measurement to pieces currently at 227 pieces per foot
  - Add actual piece counts for flats and small parcels
- Conducted over a continuous 2-week period and four consecutive Saturdays.
- Mail density is measured at least once annually

Service Performance Measurement



First Mile Sampling

Postal employees will scan letters and flats at randomly selected collection points

- Collection boxes and Postal Lobby Chutes will be randomly selected for sampling
  - Collection points with higher expected densities will have proportionally greater chances of selection
  - The same number of piece scans will be requested at each collection box per sampling group

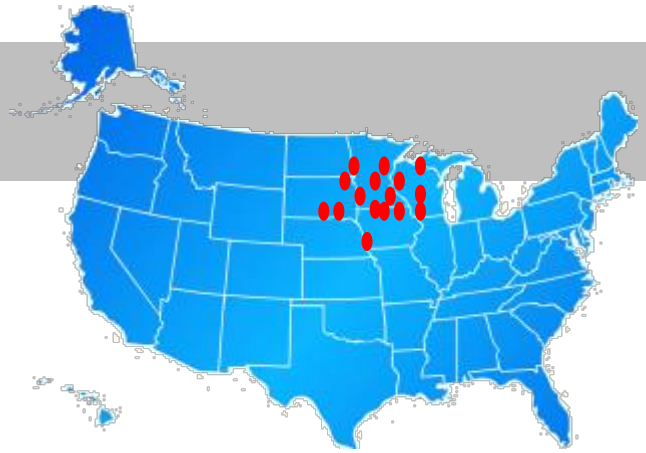
- Two sampling groups have been defined for First Mile sampling:

Letters/cards

Flats

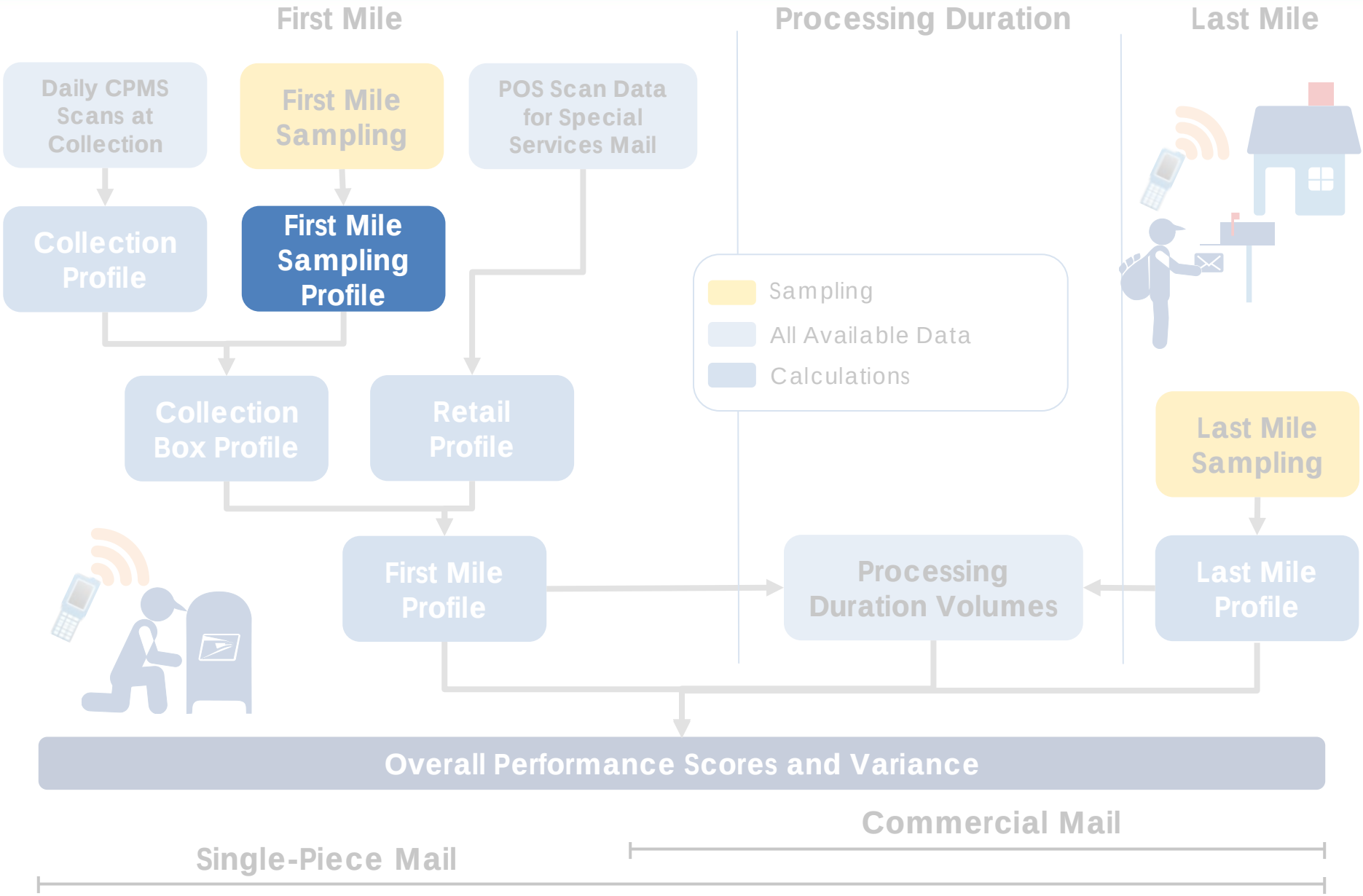
First Mile Sampling

Definition and parameters for First Mile sampling targets



- An estimated 200 collection points are targeted per district per week
- Target performance estimates with margins of error between +/- 0.5% and +/-1% per quarter
- Proportioned by 3-digit ZIP Code by delivery point density (population)
- Sampling for each day of week will be set in proportion to the mail volumes historically mailed on that day of week

Service Performance Measurement

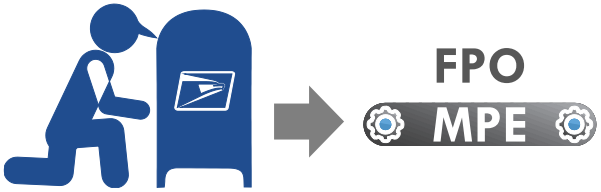


First Mile Sampling Profile

First Mile Sampling Profile

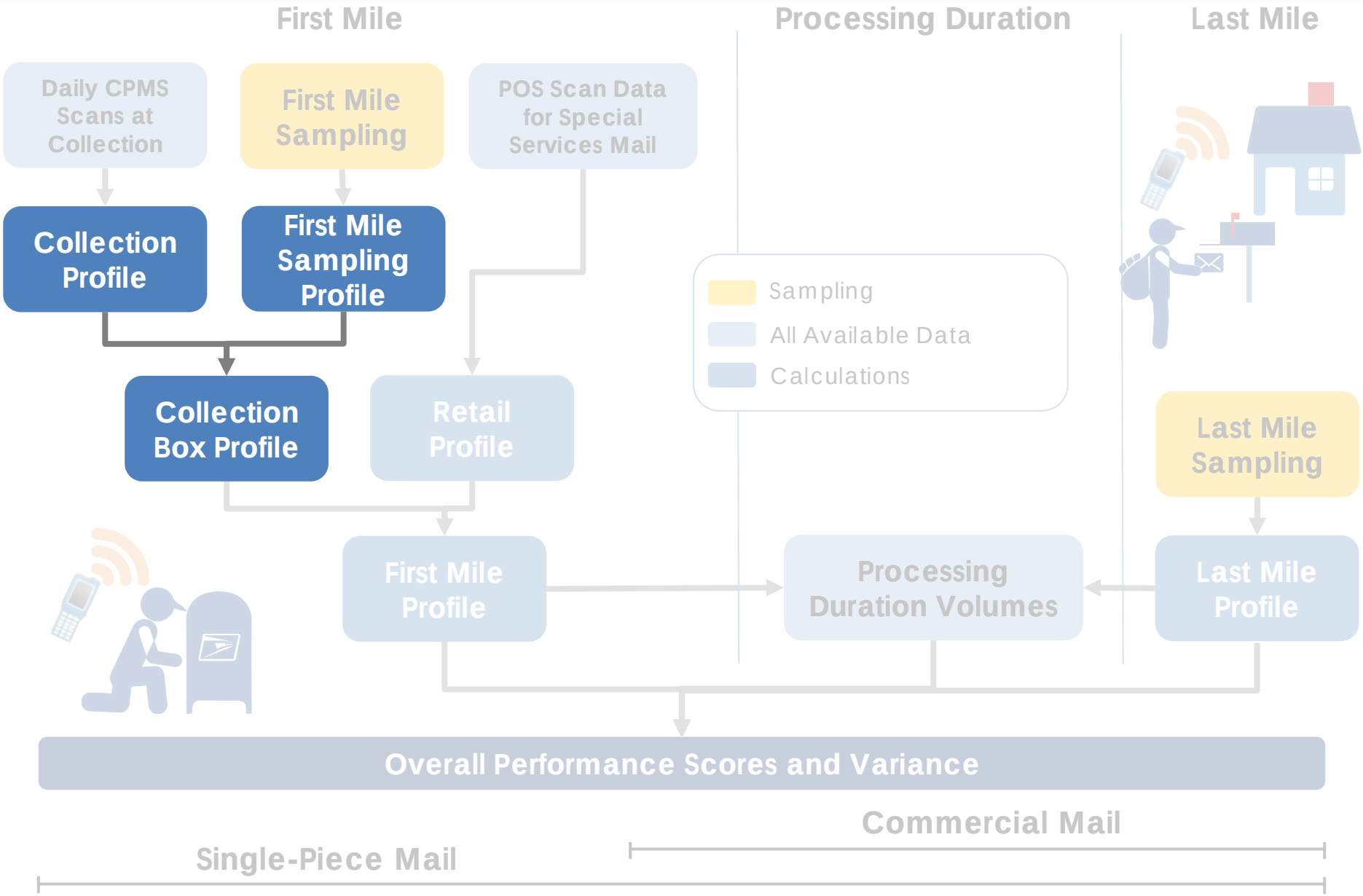
First Mile Sampling Profile based on:

anticipated induction date *minus* **date of sampling**

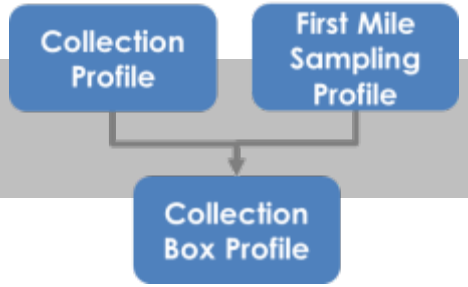


- First Mile Sampling Profile is aggregated based on origin district, collection date, mail shape, and first processing operation (FPO) type.
  - FPO1 – outgoing processing operations (the expected initial processing)
  - FPO2 – all other processing operations
- First Mile Sampling Profile will be calculated as the weighted average proportion of pieces having *k* days prior to first processing, with *k* ranging from -1 to 30

Service Performance Measurement



Collection Box Profile

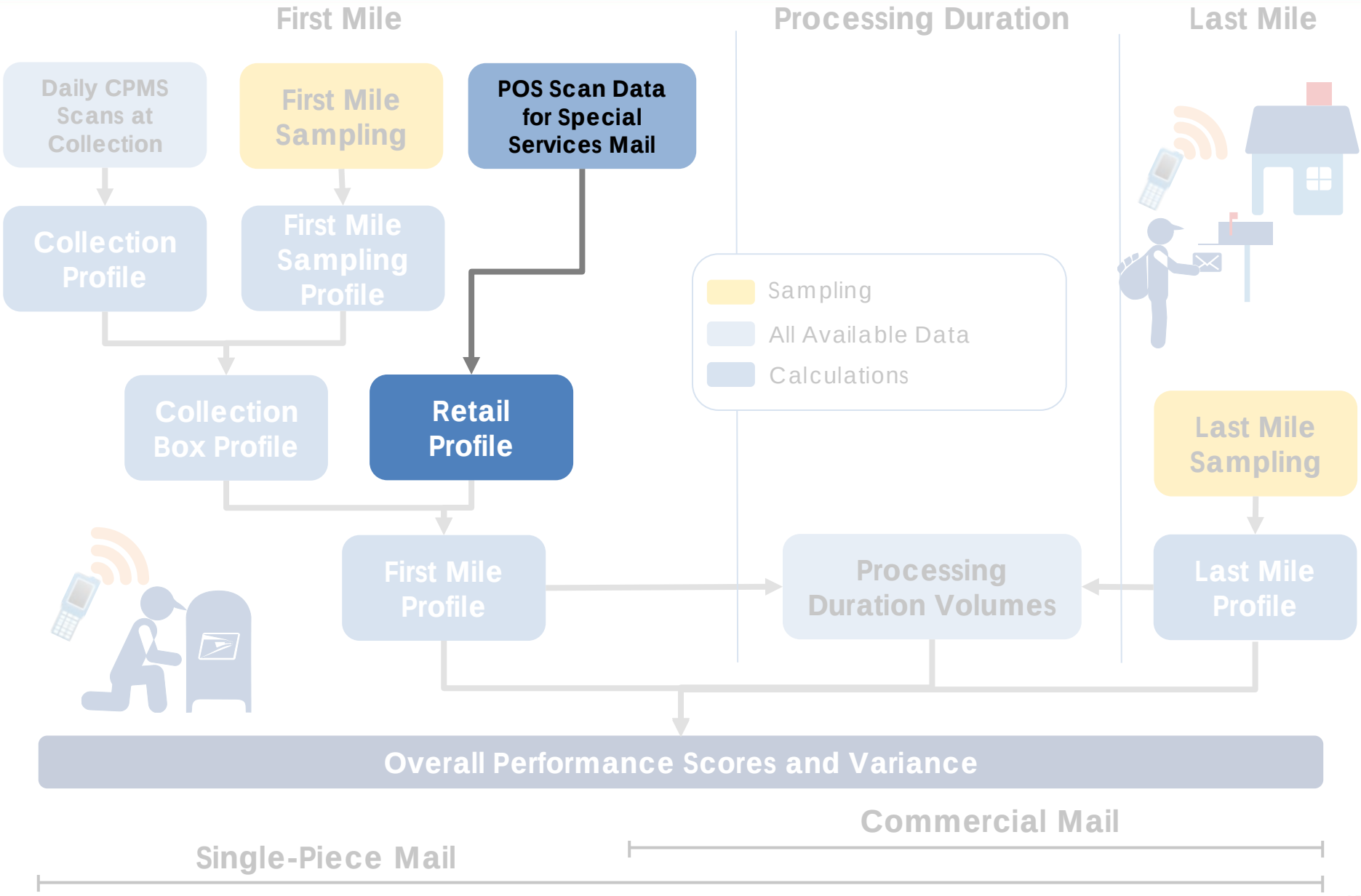


Collection Profile and First Mile Sampling Profile will be combined to create overall Collection Box Profile

- The statistical model assumes the Collection Profile and First Mile Sampling Profile are independent.

- The Collection Box Profile estimates the proportion of single-piece letters/cards or flats which spent *k* total days in First Mile, with *k* ranging from -1 to 30

Service Performance Measurement



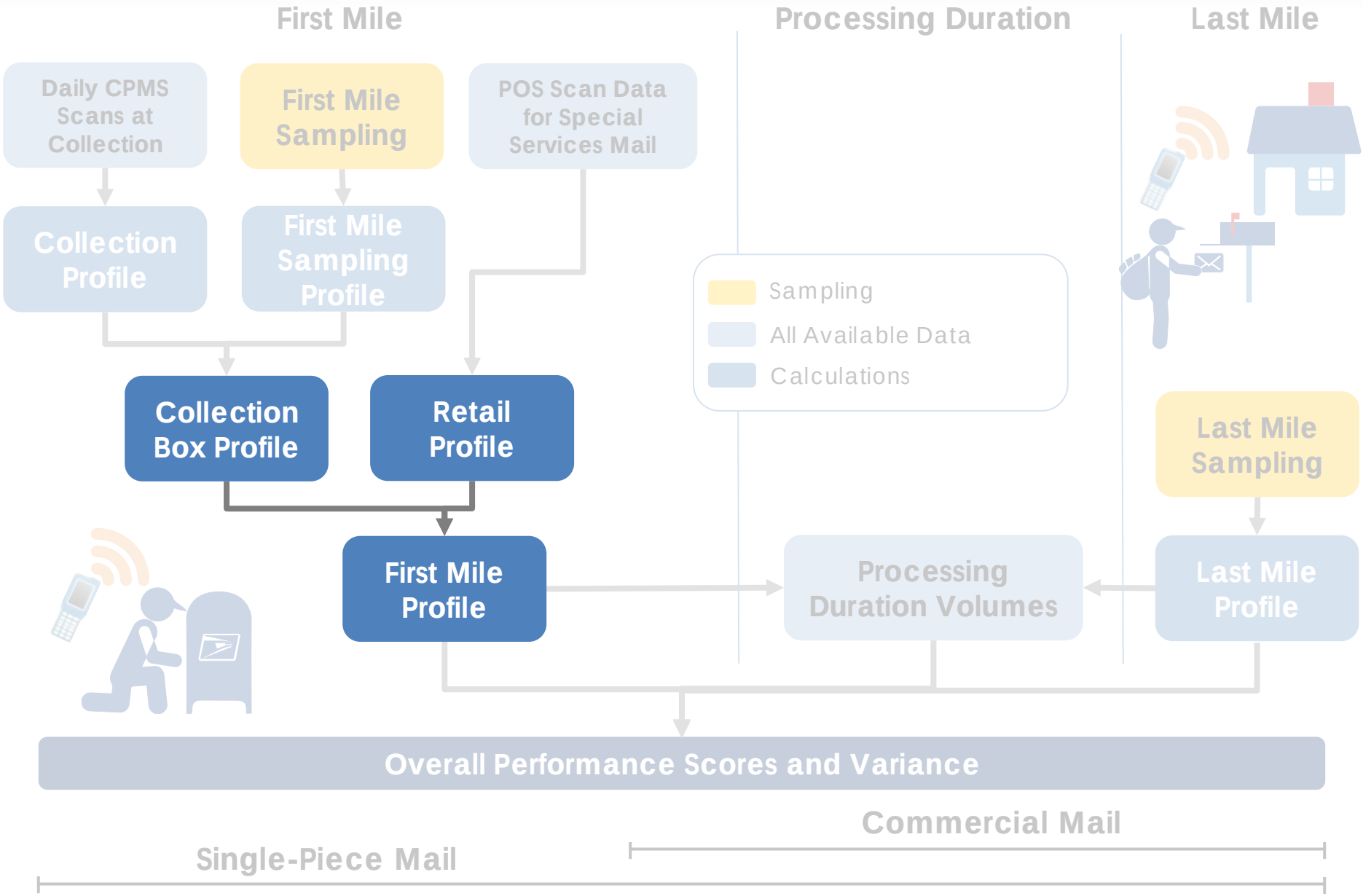
First Mile Retail Mail Profile

POS Scan Data for Special Services Mail → Retail Profile

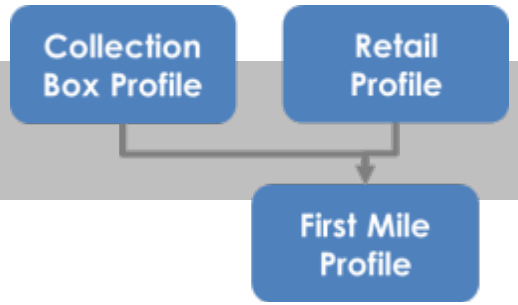
Point of Sale (POS) scan data will be matched with scans from first processing operation

- POS scan data for mail with Special Services (e.g., Certified Mail) will be used to measure the First Mile for retail channel
- Retail Profile will be calculated for each origin district, anticipated induction date, FPO grouping for letters/cards and flats as the proportion of retail mail with *k* days in First Mile, where *k* ranges from -1 to 30

Service Performance Measurement

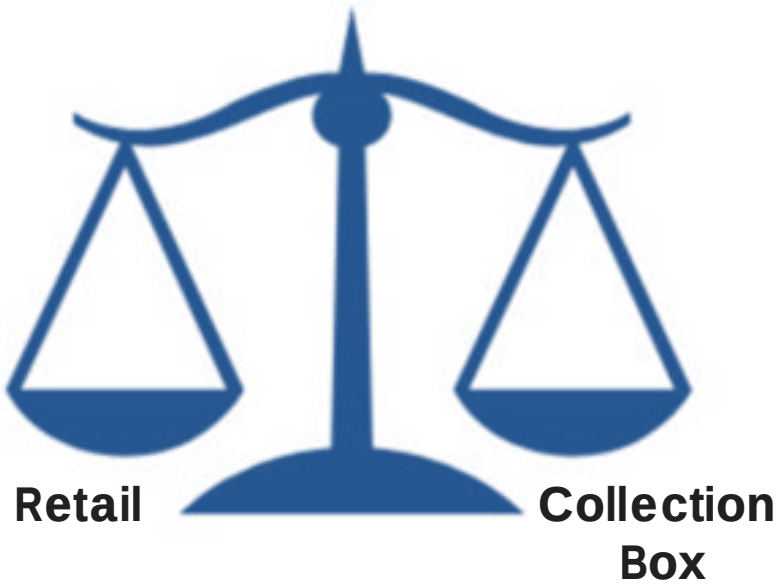


First Mile Profile

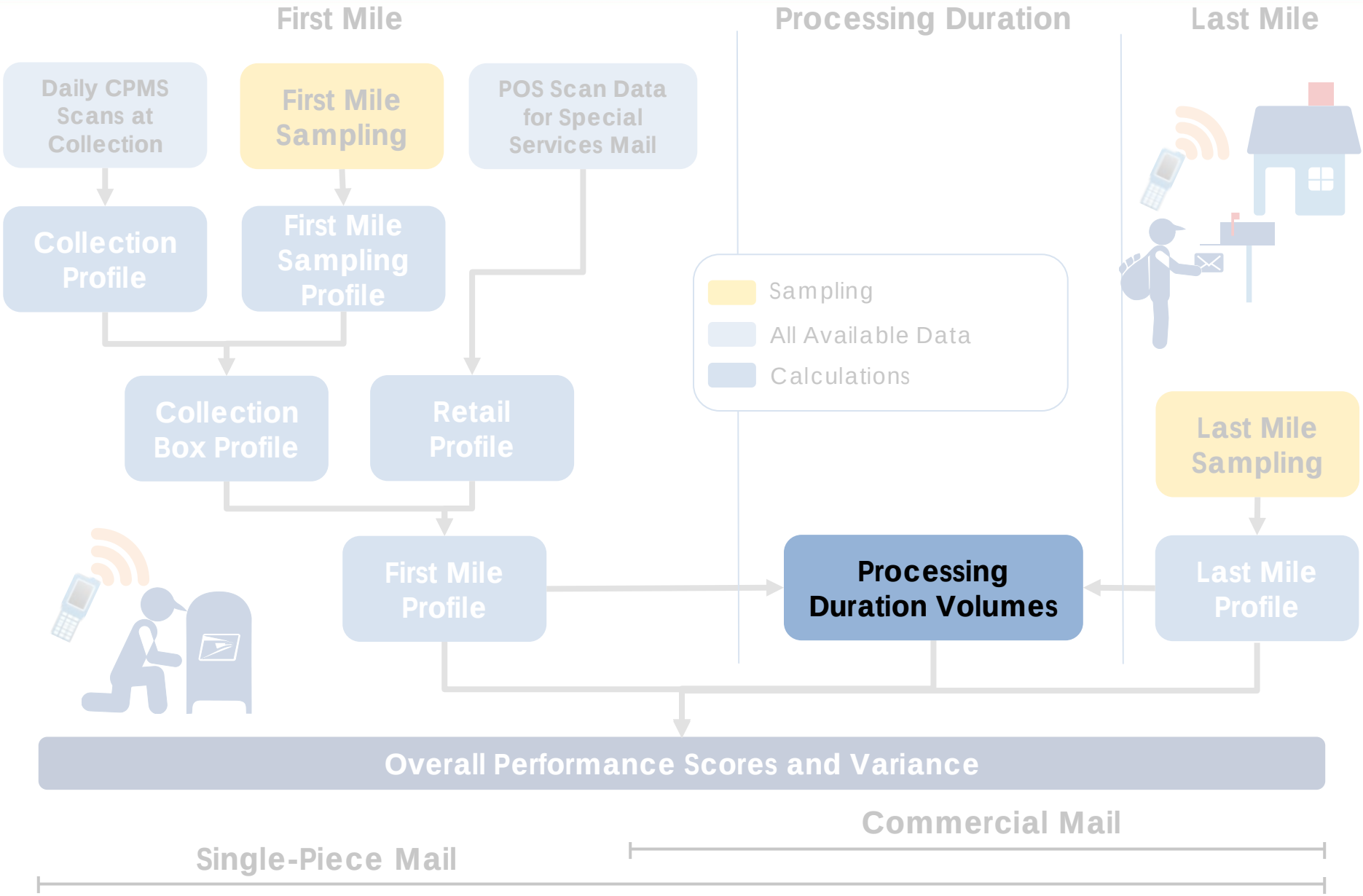


First Mile Profile for all Single-Piece First-Class Mail combines Retail Profile and Collection Box Profile

- Retail and Collection Box Profiles will be weighted by their respective portions of originating volumes
  - 2013 Mail Source Study will be used to derive initial weights



Service Performance Measurement



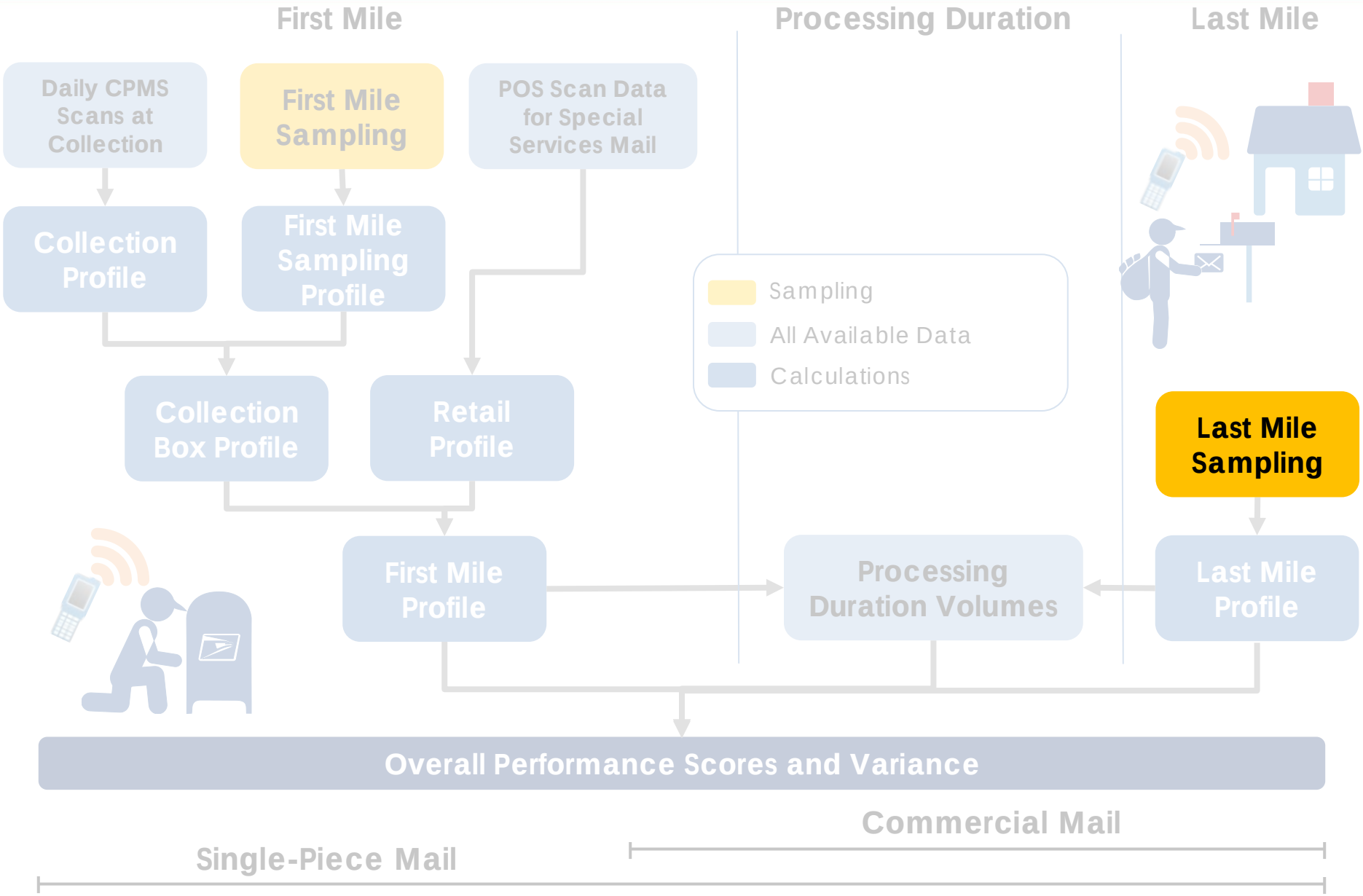
Processing Duration

Processing Duration Volumes

Processing Duration is measured from first processing operation or Start-the-Clock to last processing operation

- Single-Piece First-Class Mail
  - Anticipated Induction Date through Anticipated Delivery Date
- Commercial mail
  - Start-the-Clock to Anticipated Delivery Date
- Processing Duration is measured for all mail for which we have the required information to measure performance accurately
- Billions of pieces will be measured each quarter

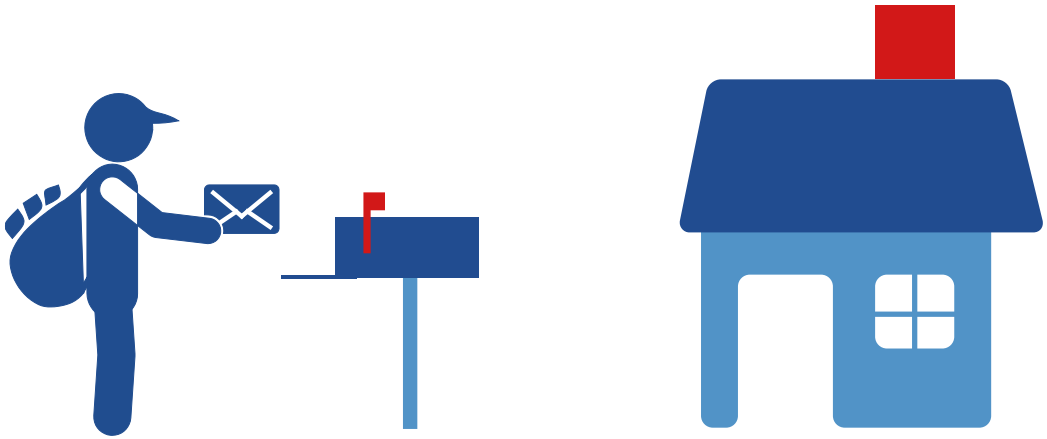
Service Performance Measurement



Last Mile Sampling

Postal employees will scan letters and flats at randomly selected delivery points

- Delivery points will be randomly selected
  - All delivery points have a probability of being selected
  - Delivery points with higher expected volumes will have proportionally greater chances of selection
  - There is a configurable maximum number of pieces to scan at a delivery point



Last Mile Sampling

Last Mile Sampling

Postal employees will scan letters and flats at randomly selected delivery points

- Seven sampling groups have been defined for Last Mile measurement.

First-Class Mail flats

Presort First-Class Mail letters/cards

Single-piece First-Class Mail remittance letters/cards

Single-piece First-Class Mail non-remittance letters/cards

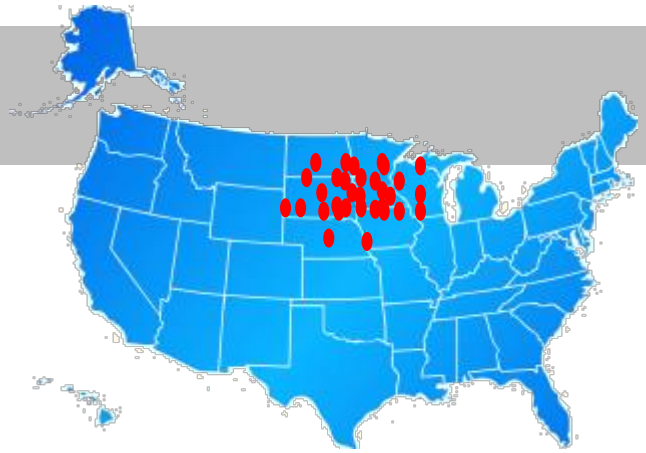
Periodicals

Standard Mail letters/cards

Standard Mail and Bound Printed Matter flats

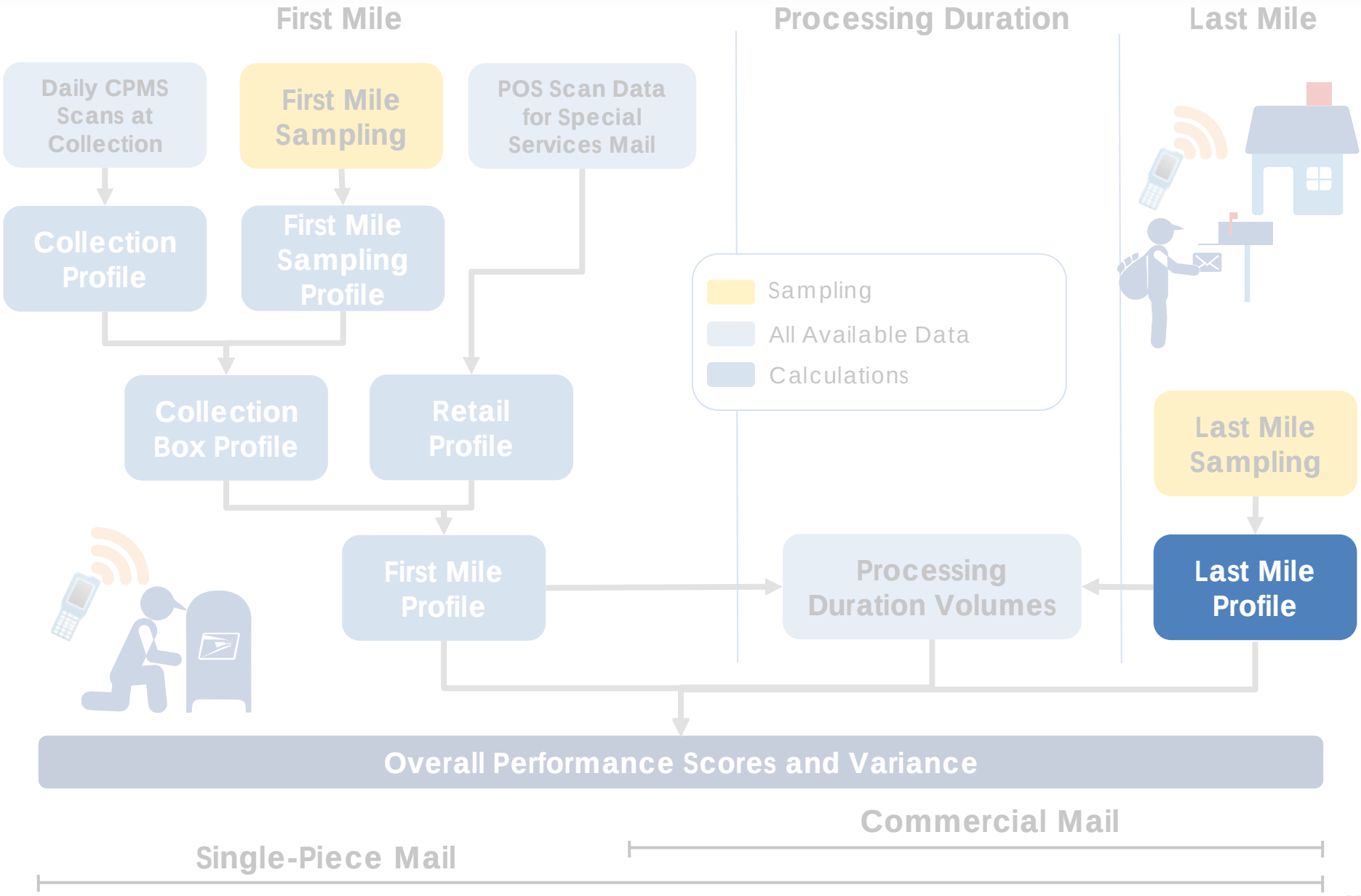
Last Mile Sampling

Definition and parameters for Last Mile sampling targets



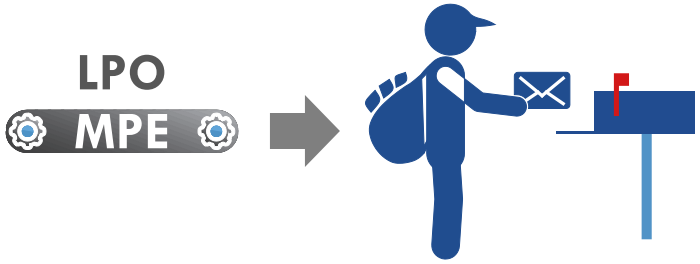
- Estimated 500 delivery points are targeted per day in most districts
  - Target performance estimates with margins of error less than +/-1%, except for First-Class Mail Flats (+/-3%) and Periodicals (+/-2%) per quarter
  - Alaska, Caribbean, and Honolulu districts have lower sampling targets due to the limited number of delivery points and routes
- Proportioned by 3-digit ZIP Code by delivery point density

Service Performance Measurement



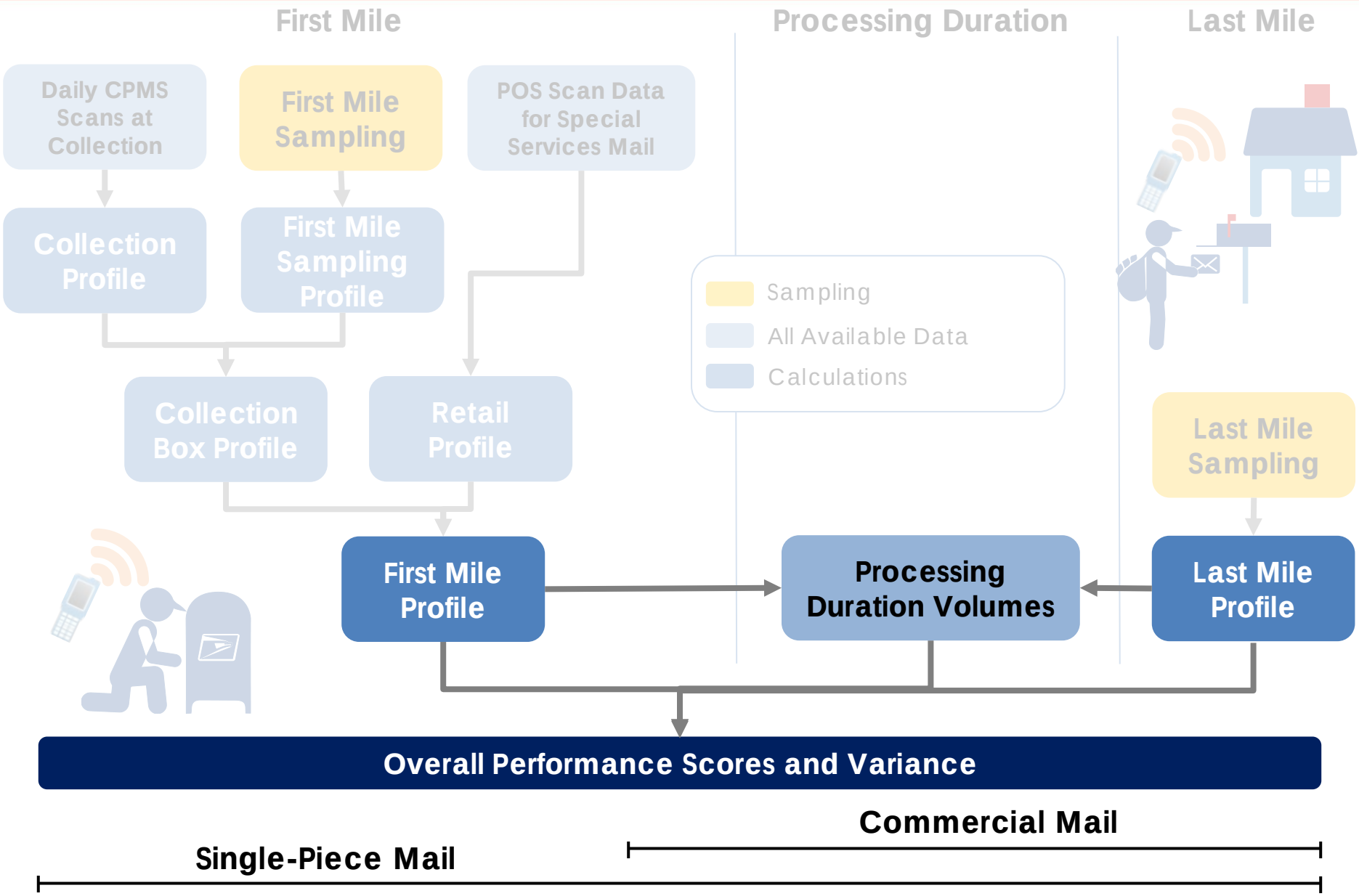
Last Mile Profile

Last Mile Profile based on: **sample date** *minus* **anticipated date of delivery** *minus* **# of non-delivery days** (Sunday)



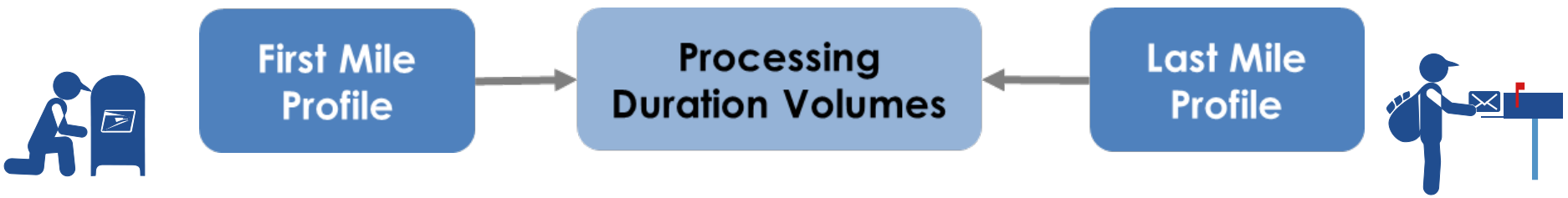
- Last Mile Profile is aggregated based on destination district, Anticipated Delivery Date, Days Left to meet service standard, and Sampling Group
- Last Mile Profile will be calculated as the weighted average proportion of pieces with *k* days in Last Mile, with *k* ranging from -1 to 30

Service Performance Measurement

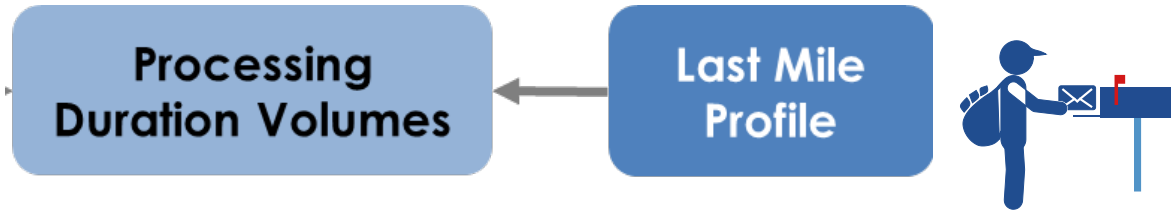


Overall Service Performance Calculation

Single-Piece First-Class Mail performance estimates involve combining data from 3 segments:



Commercial Mail performance estimates involve combining data from 2 segments:



- Estimation approach includes calculations for
  - On-time service performance
  - Service variance (+1, +2, +3 Days)
  - Margins of error for 95% confidence intervals

Overall Service Performance Calculation

- Calculation of overall performance involves the combination of First-Mile Profile, Processing Duration, and Last Mile Profile
- Consider an example of Single-Piece First-Class Mail letters sent from Gulf Atlantic to Los Angeles:

Gulf Atlantic FM Profile

First Mile Days	% of Mail
0	98%
1	2%

Pieces with Origin Gulf Atlantic and Destination Los Angeles

Processing Duration	Number of Pieces
1	100
2	400
3	1000
4	100
Total	1600

Los Angeles LM Profile*

Last Mile Days	% of Mail
0	97%
1	3%

* For example simplification, assume the Last Mile Profile is the same for all Days Left Groups..

Overall Service Performance Calculation

- First apply the First Mile Profile to Processing Duration to estimate transit-time from First Mile to Anticipated Delivery Date

Inputs Needed

First Mile Days	% of Mail
0	98%
1	2%

Processing Duration	Number of Pieces
1	100
2	400
3	1000
4	100

Calculations

First Mile + Processing Duration	Transit Days	Calculation	Estimated Volume
0 + 1	1	=98% * 100	98
0 + 2	2	=98% *400	392
0 + 3	3	=98% *1000	980
0 + 4	4	=98% *100	98
1 + 1	2	=2% *100	2
1 + 2	3	=2% *400	8
1 + 3	4	=2% *1000	20
1 + 4	5	=2% *100	2
Total			1600

Overall Service Performance Calculation

- Now apply the Last Mile Profile to estimate the overall transit-time

Additional Inputs

Last Mile Days	% of Mail
0	97%
1	3%

Calculations

First Mile + Processing Duration + Last Mile	Transit Days	Calculation	Estimated Volume
1 + 0	1	=98 * 97%	95.06
2 + 0	2	=(392+2) * 97%	382.18
3 + 0	3	=(980+8) * 97%	958.36
4 + 0	4	=(98 + 20) * 97%	114.46
5 + 0	5	=2 * 97%	1.94
1 + 1	2	=98 * 3%	2.94
2 + 1	3	=(392+2) * 3%	11.82
3 + 1	4	=(980+8) * 3%	29.64
4 + 1	5	=(98 + 20) * 3%	3.54
5 + 1	6	=2 * 3%	0.06
Total			1600

Overall Service Performance Calculation

- Calculate the estimated volume and percent of mail delivered on-time and the service variance, for a 3-Day service standard

Volume Estimates

Transit Days	Calculation	Estimated Volume
1	=95.06	95.06
2	=382.18 + 2.94	385.12
3	=958.36 + 11.82	970.18
4	=114.46 + 29.64	144.10
5	=1.94 + 3.54	5.48
6	=0.06	0.06
Total		1600

Performance Estimates

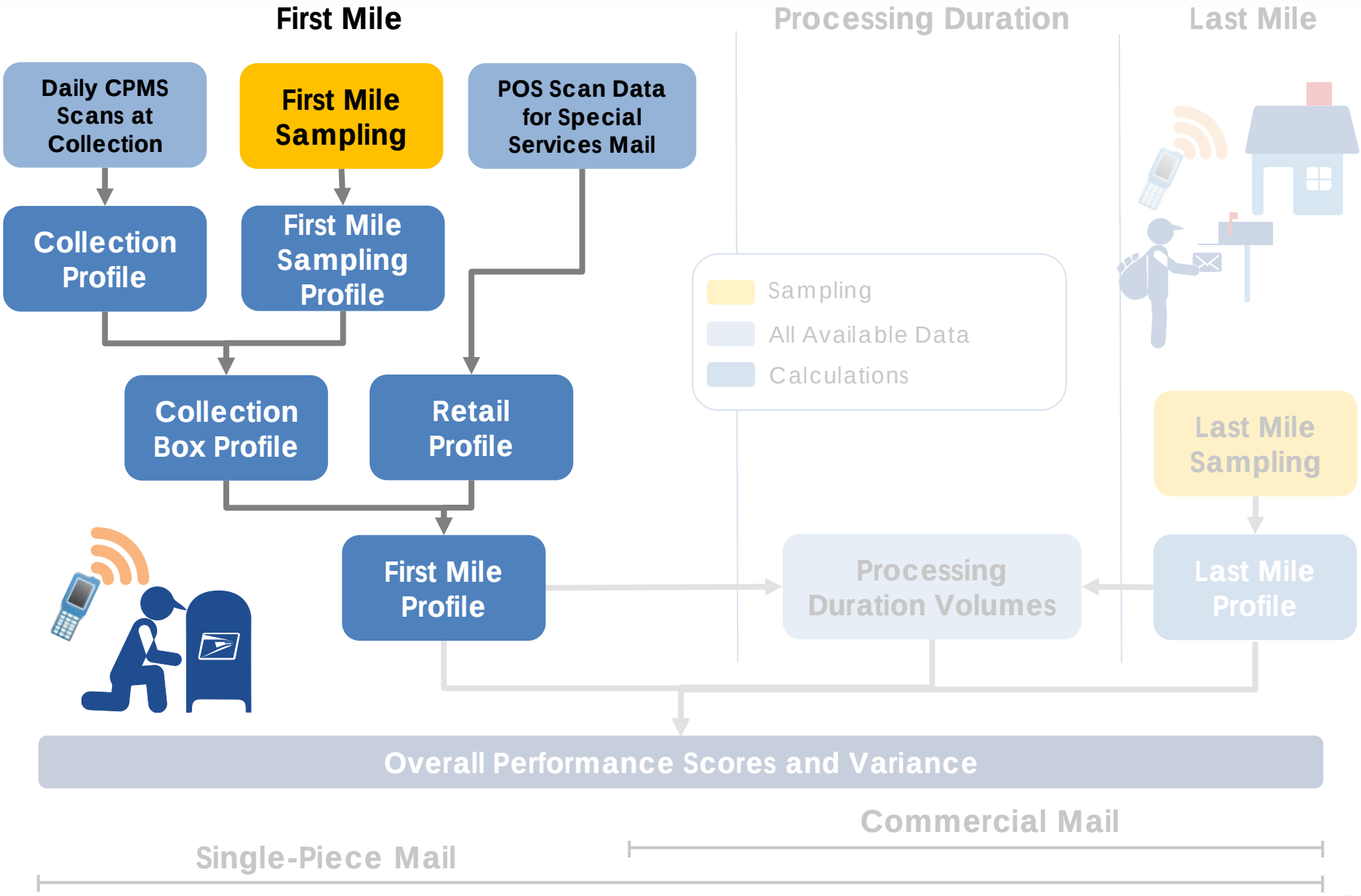
Metric	Calculation	Score
On-Time	=(95.06+385.12+970.18)/1600	90.65%
+ 1 Day	=90.65% + (144.10/1600)	99.65%
+ 2 Days	=99.65% + (5.48/1600)	100.00%
+ 3 Days	=100.00% + (0.06/1600)	100.00%

Questions

Appendix: Calculations

- First Mile Profile Calculation Example
- Last Mile Profile Calculation Example

Service Performance Measurement



- The following First Mile Profile Calculation example slides are Based on response to CHIR #3, Question #1, File Name: Illustration of First Mile Profile and Performance Calculations.xlsx.

First Mile Profile Calculation Example

- Step 1: Gather collection profile densities by collection date based on the latest observed collection scan information for each collection box on each date

Collection profile

Sampling Group 1

Collection Date	days in phase Dc	Density
8-Jun	0	25000
	1	5000
9-Jun	0	36000
	1	4000

- This examples does not illustrate density calculations; it is assumed that the data are available

First Mile Profile Calculation Example

- Step 2: Calculate the PPS weight to be used in the First Mile Sampling Profile Calculations for all mailpieces from every sampled collection box

Sampling Group 1

Box id	Collection Date	Sum_Mdi (Summation of the density size for each collection box I on collection date D)	n(D) Number of collection boxes sampled	m(G,D,SB) Number of usable pieces scanned for sampling group G at the sampled collection box SB	Weight	FPO
Collection box A	8-Jun	30000	3	5	2000	1
Collection box B	8-Jun	30000	3	4	2500	1
Collection Box C	8-Jun	30000	3	2	5000	1
Collection box D	9-Jun	42000	4	5	2100	1
Collection box E	9-Jun	42000	4	5	2100	1
Collection Box F	9-Jun	42000	4	3	3500	1
Collection Box G	9-Jun	42000	4	1	10500	1

PPS weight for collection box A is

- **The sum of density sizes across all collection boxes in box A's district on collection date D**

First Mile Profile Calculation Example

- Step 2: Calculate the PPS weight to be used in the First Mile Sampling Profile Calculations for all mailpieces from every sampled collection box

Sampling Group 1

Box id	Collection Date	Sum_Mdi (Summation of the density size for each collection box I on collection date D)	n(D) Number of collection boxes sampled	m(G,D,SB) Number of usable pieces scanned for sampling group G at the sampled collection box SB	Weight	FPO
Collection box A	8-Jun	30000	3	5	2000	1
Collection box B	8-Jun	30000	3	4	2500	1
Collection Box C	8-Jun	30000	3	2	5000	1
Collection box D	9-Jun	42000	4	5	2100	1
Collection box E	9-Jun	42000	4	5	2100	1
Collection Box F	9-Jun	42000	4	3	3500	1
Collection Box G	9-Jun	42000	4	1	10500	1

PPS weight for collection box A is

- **The sum of density sizes across all collection boxes in box A's district on collection date D**
- **Divided by the number of collection boxes sampled on collection date D in the district times the number of usable sampled pieces for sampling group G from collection box A on collection date D**

First Mile Profile Calculation Example

- Step 2: Calculate the PPS weight to be used in the First Mile Sampling Profile Calculations for all mailpieces from every sampled collection box

Sampling Group 1

Box id	Collection Date	Sum_Mdi (Summation of the density size for each collection box I on collection date D)	n(D) Number of collection boxes sampled	m(G,D,SB) Number of usable pieces scanned for sampling group G at the sampled collection box SB	Weight	FPO
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Collection box B	8-Jun	30000	3	4	2500	1
Collection Box C	8-Jun	30000	3	2	5000	1
Collection box D	9-Jun	42000	4	5	2100	1
Collection box E	9-Jun	42000	4	5	2100	1
Collection Box F	9-Jun	42000	4	3	3500	1
Collection Box G	9-Jun	42000	4	1	10500	1

PPS weight for collection box A is

- **The sum of density sizes across all collection boxes in box A's district on collection date D**
- **Divided by the number of collection boxes sampled on collection date D in the district, times the number of usable sampled pieces for sampling group G from collection box A on collection date D**

Density for box A on 6/8 = 30000/(3*5)=2000

First Mile Profile Calculation Example

- Step 3: Calculate the First Mile Sampling Profile for the given sampling group and FPO group for each collection date for all possible values of First Mile Sampling Days in Phase

FM Sampling profile calculation for Collection Date of June 8, FPO=1, sampling group 1

Box id	Days in First Mile Sampling phase D(CS)	Pieces
Collection box A	0	4
	1	1
Collection Box B	0	2
	1	1
	2	1
Collection box C	0	2

Box id	Collection Date	Weight	FPO
Collection box A	8-Jun	2000	1
Collection box B	8-Jun	2500	1
Collection Box C	8-Jun	5000	1

	Days in FM Sampling	Profile %
FM Sampling profile days	0	76.67%
percentage for Collection	1	15.00%
Date of June 8	2	8.33%

Total pieces sampled on 6/8 for sampling group 1 and FPO 1

First Mile Profile Calculation Example

- Step 3: Calculate the First Mile Sampling Profile for the given sampling group and FPO group for each collection date for all possible values of First Mile Sampling Days in Phase

FM Sampling profile calculation for Collection Date of June 8, FPO=1, sampling group 1

Box id	Days in First Mile Sampling phase D(CS)	Pieces
Collection box A	0	4
	1	1
Collection Box B	0	2
	1	1
	2	1
Collection box C	0	2

Box id	Collection Date	Weight	FPO
Collection box A	8-Jun	2000	1
Collection box B	8-Jun	2500	1
Collection Box C	8-Jun	5000	1

	Days in FM Sampling	Profile %
FM Sampling profile days	0	76.67%
percentage for Collection	1	15.00%
Date of June 8	2	8.33%

Weights for pieces sampled on 6/8 for sampling group 1 and FPO 1

First Mile Profile Calculation Example

- Step 3: Calculate the First Mile Sampling Profile for the given sampling group and FPO group for each collection date for all possible values of First Mile Sampling Days in Phase

FM Sampling profile calculation for Collection Date of June 8, FPO=1, sampling group 1

Box id	Days in First Mile Sampling phase D(CS)	Pieces
Collection box A	0	4
	1	1
Collection Box B	0	2
	1	1
	2	1
Collection box C	0	2

Box id	Collection Date	Weight	FPO
Collection box A	8-Jun	2000	1
Collection box B	8-Jun	2500	1
Collection Box C	8-Jun	5000	1

	Days in FM Sampling	Profile %
FM Sampling profile days	0	76.67%
percentage for Collection	1	15.00%
Date of June 8	2	8.33%

Pieces for sampling group 1 and FPO 1 with 0 days in First Mile Sampling

First Mile Profile Calculation Example

- Step 3: Calculate the First Mile Sampling Profile for the given sampling group and FPO group for each collection date for all possible values of First Mile Sampling Days in Phase

FM Sampling profile calculation for Collection Date of June 8, FPO=1, sampling group 1

Box id	Days in First Mile Sampling phase D(CS)	Pieces
Collection box A	0	4
	1	1
Collection Box B	0	2
	1	1
	2	1
Collection box C	0	2

Box id	Collection Date	Weight	FPO
Collection box A	8-Jun	2000	1
Collection box B	8-Jun	2500	1
Collection Box C	8-Jun	5000	1

	Days in FM Sampling	Profile %
FM Sampling profile days	0	76.67%
percentage for Collection	1	15.00%
Date of June 8	2	8.33%

First Mile sampling profile percentage for 6/8 = weighted average of pieces with 0 days in FM Sampling

First Mile Profile Calculation Example

- Step 3: Calculate the First Mile Sampling Profile for the given sampling group and FPO group for each collection date for all possible values of First Mile Sampling Days in Phase

FM Sampling profile calculation for Collection Date of June 8, FPO=1, sampling group 1

Box id	Days in First Mile Sampling phase D(CS)	Pieces
Collection box A	0	4
	1	1
Collection Box B	0	2
	1	1
	2	1
Collection box C	0	2

Box id	Collection Date	Weight	FPO
Collection box A	8-Jun	2000	1
Collection box B	8-Jun	2500	1
Collection Box C	8-Jun	5000	1

	Days in FM Sampling	Profile %
FM Sampling profile days	0	76.67%
percentage for Collection	1	15.00%
Date of June 8	2	8.33%

First Mile sampling profile percentage for 6/8 = weighted average of pieces with 0 days in FM Sampling

= [(4*2000)+(2*2500)+(2*5000)]/[(5*2000)+(4*2500)+(2*5000)] = 76.67%

First Mile Profile Calculation Example

- Step 4: Combine the First Sampling Profile with the Collection Profile to calculate the Collection Box Profile for the given sampling group, FPO group and anticipated induction date for all possible values of Days in First Mile.

Collection profile

Sampling Group 1

Collection Date	days in phase Dc	Density
8-Jun	0	25000
	1	5000
9-Jun	0	36000
	1	4000

Identify all First Mile Sampling Profiles for AID of 6/9

FM Sampling profile days percentage for Collection Date of June 8

Anticipated Induction Date	Days in FM Sampling	Profile %
8-Jun	0	76.67%
9-Jun	1	15.00%
10-Jun	2	8.33%

FM Sampling profile days percentage for Collection Date of June 9

Anticipated Induction Date	Days in FM Sampling	Profile %
9-Jun	0	50.00%
10-Jun	1	15.00%
11-Jun	2	5.00%
12-Jun	3	5.00%
13-Jun	4	25.00%

Collection Box (CB) Profile

Anticipated Induction Date (AID) of June 9 for sampling group 1, FPO=1			Dn	CB density proportion
DFM=0	Combination 1	CD of June 9 and 0 day in CP and CS	18000	**75.8%**
DFM=1	Combination 1	CD of June 8 and 0 day in CP and 1 day in CS	3750	
DFM=1	Combination 2	CD of June 9 and 1 day in CP and 0 day in CS	2000	**24.2%**
TOTAL			23750	

First Mile Profile Calculation Example

- Step 4: Combine the First Sampling Profile with the Collection Profile to calculate the Collection Box Profile for the given sampling group, FPO group and anticipated induction date for all possible values of Days in First Mile.

Collection profile

Sampling Group 1

Collection Date	days in phase Dc	Density
8-Jun	0	25000
	1	5000
9-Jun	0	36000
	1	4000

Combine with Collection profile densities by Collection Date to create all possible combinations by Days in First Mile (DFM)

FM Sampling profile days percentage for Collection Date of June 8

Anticipated Induction Date	Days in FM Sampling	Profile %
8-Jun	0	76.67%
9-Jun	1	15.00%
10-Jun	2	8.33%

FM Sampling profile days percentage for Collection Date of June 9

Anticipated Induction Date	Days in FM Sampling	Profile %
9-Jun	0	50.00%
10-Jun	1	15.00%
11-Jun	2	5.00%
12-Jun	3	5.00%
13-Jun	4	25.00%

Collection Box (CB) Profile

Anticipated Induction Date (AID) of June 9 for sampling group 1, FPO=1			Dn	CB density proportion
DFM=0	Combination 1	CD of June 9 and 0 day in CP and CS	18000	**75.8%**
DFM=1	Combination 1	CD of June 8 and 0 day in CP and 1 day in CS	3750	
DFM=1	Combination 2	CD of June 9 and 1 day in CP and 0 day in CS	2000	**24.2%**
TOTAL			23750	

First Mile Profile Calculation Example

- Step 4: Combine the First Sampling Profile with the Collection Profile to calculate the Collection Box Profile for the given sampling group, FPO group and anticipated induction date for all possible values of Days in First Mile.

Collection profile

Sampling Group 1

Collection Date	days in phase Dc	Density
8-Jun	0	25000
	1	5000
9-Jun	0	36000
	1	4000

Only one combination yields DFM = 0 for AID of 6/9

	Anticipated Induction Date	Days in FM Sampling	Profile %
FM Sampling profile days percentage for Collection Date of June 8	8-Jun	0	76.67%
	9-Jun	1	15.00%
	10-Jun	2	8.33%

	Anticipated Induction Date	Days in FM Sampling	Profile %
FM Sampling profile days percentage for Collection Date of June 9	9-Jun	0	50.00%
	10-Jun	1	15.00%
	11-Jun	2	5.00%
	12-Jun	3	5.00%
	13-Jun	4	25.00%

Collection Box (CB) Profile

Anticipated Induction Date (AID) of June 9 for sampling group 1, FPO=1			Dn	CB density proportion
DFM=0	Combination 1	CD of June 9 and 0 day in CP and CS	18000	**75.8%**
DFM=1	Combination 1	CD of June 8 and 0 day in CP and 1 day in CS	3750	
DFM=1	Combination 2	CD of June 9 and 1 day in CP and 0 day in CS	2000	**24.2%**
TOTAL			23750	

First Mile Profile Calculation Example

- Step 4: Combine the First Sampling Profile with the Collection Profile to calculate the Collection Box Profile for the given sampling group, FPO group and anticipated induction date for all possible values of Days in First Mile.

Collection profile

Sampling Group 1

Collection Date	days in phase Dc	Density
8-Jun	0	25000
	1	5000
9-Jun	0	36000
	1	4000

- **Calculate the density for each combination of DFM by multiplying the Collection Profile density by the corresponding First Mile Sampling profile percentage**
- **Density for DFM = 0 is 36000*50% = 18000**

FM Sampling profile days percentage for Collection Date of June 8

Anticipated Induction Date	Days in FM Sampling	Profile %
8-Jun	0	76.67%
9-Jun	1	15.00%
10-Jun	2	8.33%

FM Sampling profile days percentage for Collection Date of June 9

Anticipated Induction Date	Days in FM Sampling	Profile %
9-Jun	0	50.00%
10-Jun	1	15.00%
11-Jun	2	5.00%
12-Jun	3	5.00%
13-Jun	4	25.00%

Collection Box (CB) Profile

Anticipated Induction Date (AID) of June 9 for sampling group 1, FPO=1			Dn	CB density proportion
DFM=0	Combination 1	CD of June 9 and 0 day in CP and CS	18000	**75.8%**
DFM=1	Combination 1	CD of June 8 and 0 day in CP and 1 day in CS	3750	
DFM=1	Combination 2	CD of June 9 and 1 day in CP and 0 day in CS	2000	**24.2%**
TOTAL			23750	

First Mile Profile Calculation Example

- Step 4: Combine the First Sampling Profile with the Collection Profile to calculate the Collection Box Profile for the given sampling group, FPO group and anticipated induction date for all possible values of Days in First Mile.

Collection profile

Sampling Group 1

Collection Date	days in phase Dc	Density
8-Jun	0	25000
	1	5000
9-Jun	0	36000
	1	4000

- **Collection Box Profile density Proportion for DFM = 0 is the density for DFM = 0 divided by the total density for AID of 6/9**
- **Density proportion for DFM = 0 is 18000/23750 = 75.8%**

	Anticipated Induction Date	Days in FM Sampling	Profile %
FM Sampling profile days percentage for Collection Date of June 8	8-Jun	0	76.67%
	9-Jun	1	15.00%
	10-Jun	2	8.33%

	Anticipated Induction Date	Days in FM Sampling	Profile %
FM Sampling profile days percentage for Collection Date of June 9	9-Jun	0	50.00%
	10-Jun	1	15.00%
	11-Jun	2	5.00%
	12-Jun	3	5.00%
	13-Jun	4	25.00%

Collection Box (CB) Profile

Anticipated Induction Date (AID) of June 9 for sampling group 1, FPO=1			Dn	CB density proportion
DFM=0	Combination 1	CD of June 9 and 0 day in CP and CS	18000	**75.8%**
DFM=1	Combination 1	CD of June 8 and 0 day in CP and 1 day in CS	3750	
DFM=1	Combination 2	CD of June 9 and 1 day in CP and 0 day in CS	2000	**24.2%**
TOTAL			23750	

First Mile Profile Calculation Example

- Step 5: Calculate the Retail Profile as the percentage of retail mail with 0, 1, 2, etc. days in First Mile

Retail Profile				
Sampling Group 1 and FPO group=1				
Collection Date		Anticipated induction Date	days in phase Dc	Density
8-Jun		8-Jun	0	1500
		9-Jun	1	300
9-Jun		9-Jun	0	2500
		10-Jun	1	300
		11-Jun	2	200

For AID of June 9	FM Days=0	2500
	FM Days=1	300

For AID of June 9		Retail Profile Proportion
	FM DAYS=0	**89.3%**
	FM Days=1	**10.7%**

Retail Profile Proportion with AID of 6/9 and 0 days in First Mile = 2500/2800 = 89.3%

First Mile Profile Calculation Example

- Step 6: Calculate the FM profiles by aggregating the Collection Box Profile and Retail Profile using the respective weights

Collection Box (CB) Profile

Anticipated Induction Date (AID) of June 9 for sampling group 1, FPO=1			Dn	CB density proportion
DFM=0	Combination 1	CD of June 9	18000	**75.8%**
DFM=1	Combination 1	CD of June 8	3750	
DFM=1	Combination 2	CD of June 9	2000	**24.2%**

Retail Profile

Sampling Group 1 and FPO group=1

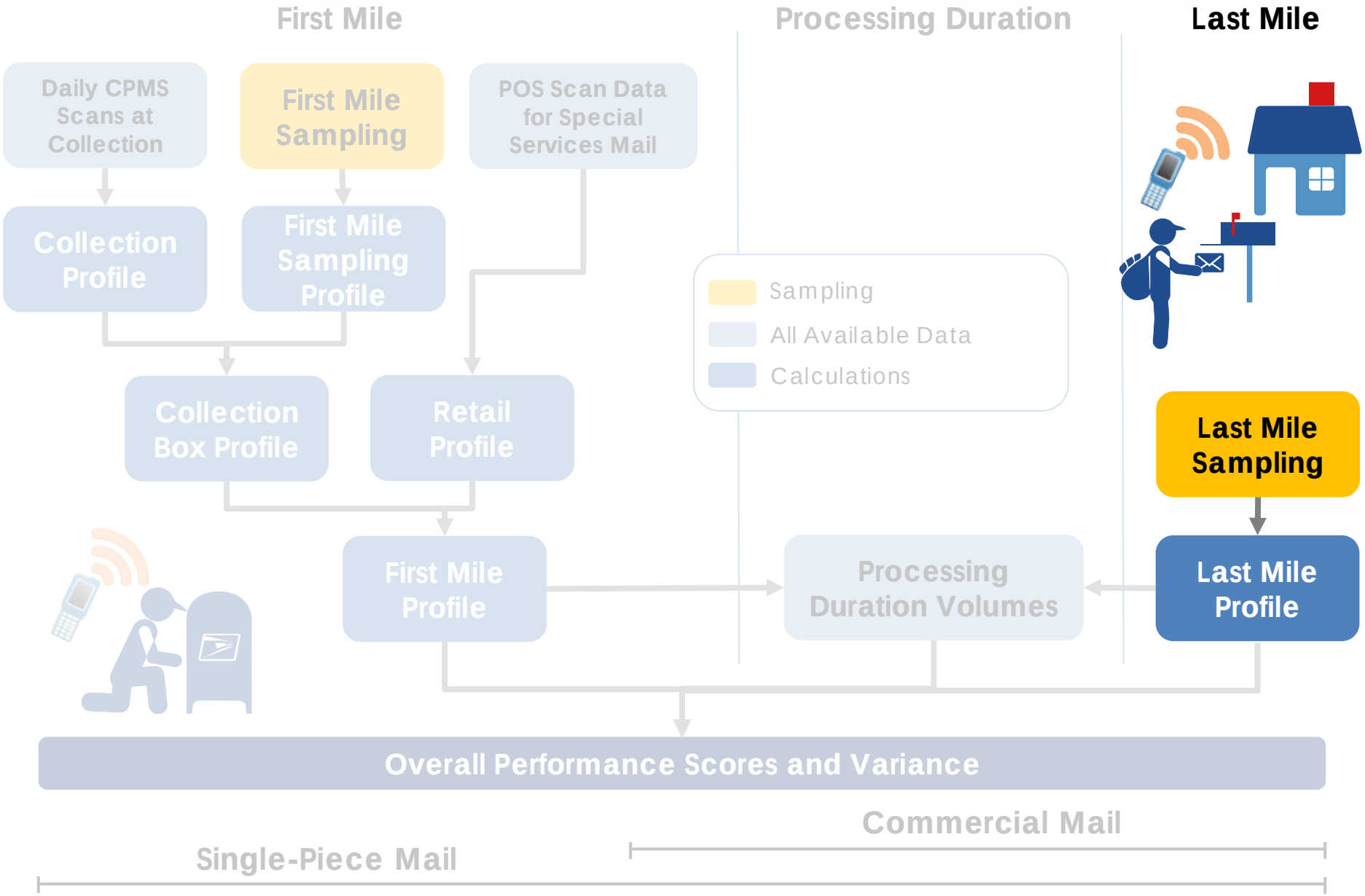
For AID of June 9	Retail Profile Proportion
FM DAYS=0	**89.3%**
FM Days=1	**10.7%**

AID of June 9 for sampling group 1, FPO=1

Overall FM profile	Weight for Collection box Profile 60% Weight for Retail Profile 40%
FM=0	**81.2%**
FM=1	**18.8%**

First Mile Profile Proportion with AID of 6/9 and 0 days in First Mile
= (0.6*75.8) + (0.4*89.3)
= 81.2%

Service Performance Measurement



- The following Last Mile Profile Calculation example slides are Based on response to CHIR #3, Question #3, File Name: Illustration of Last Mile Profile and Performance Calculations.xlsx.

Last Mile Profile Calculation Example

- Step 1: For each sampling day, gather the latest scan information for mailpieces in inventory and project the expected volume by sampling group for each delivery address based on the last observed scan and its timing

Maximum Sampling at an Address (s_bar):	20

Delivery Date (D)	Sampled Address (SA)	Expected Pieces (s_g) (w_g=1)	
		Sampling Group 1 (s_1)	Sampling Group 2~7 combined
8-Jun	A	15	10
9-Jun	B	7	6
9-Jun	C	8	10

- This examples does not illustrate size calculations by sampling group; it is assumed that the data are available

Last Mile Profile Calculation Example

- Step 2: Calculate PPS Size for each address, applying the adjustment factor (SSSW) if the expected volume is greater than the maximum sampling amount at a single address
  - SSSW represents the scaling factor to compensate for scanning only up to the maximum sampling amount at each address

Maximum Sampling at an Address (s_bar):	20

Delivery Date (D)	Sampled Address (SA)	Expected Pieces (s_g) (w_g=1)		SSSW	Address PPS Size (S_SA^zd)
		Sampling Group 1 (s_1)	Sampling Group 2~7 combined		
8-Jun	A	15	10	1.25	2.1
9-Jun	B	7	6	1	1.4
9-Jun	C	8	10	1	1.6

SSSW for sampling group 1 and sampled address A is the maximum out of the total weighted size for address A and the maximum sampling cut-off, divided by the maximum sampling cut-off = max[(15+10),20] / 20 = 25/20 = 1.25

Last Mile Profile Calculation Example

- Step 2: Calculate PPS Size for each address, applying the adjustment factor (SSSW) if the expected volume is greater than the maximum sampling amount at a single address
  - SSSW represents the scaling factor to compensate for scanning only up to the maximum sampling amount at each address

Maximum Sampling at an Address (s_bar):	20

Delivery Date (D)	Sampled Address (SA)	Expected Pieces (s_g) (w_g=1)		SSSW	Address PPS Size (S_SA^zd)
		Sampling Group 1 (s_1)	Sampling Group 2~7 combined		
8-Jun	A	15	10	1.25	2.1
9-Jun	B	7	6	1	1.4
9-Jun	C	8	10	1	1.6

PPS size for sampling group 1 and sampled address A is square root of the total weighted size for address A times the SSSW, divided by the sum of the weights

In this case all weights for sampling groups 1-7 are set to 1 so PPS size for address A = SQRT[((15 + 10) * 1.25) / 7] = 2.1

Last Mile Profile Calculation Example

- Step 3: Calculate the overall PPS size for each delivery date by adding together the individual PPS Sizes for each delivery address, and perform sampling based on the daily sampling size

Delivery Date (D)	Sampled Address (SA)	Total PPS Size (S_tot^zd)	total DPs N^zd
8-Jun	A	80000	1
9-Jun	B	50000	2
9-Jun	C	50000	2

- This example does not calculate total PPS Size or sample selection; it assumes the data are available

Last Mile Profile Calculation Example

- Step 4: Calculate the weight for each sampled address, which is dependent on the PPS size of the address, overall PPS size, number of addresses sampled, and SSSW

Delivery Date (D)	Sampled Address (SA)	SSSW	Address PPS Size (S_SA^zd)	Total PPS Size (S_tot^zd)	total DPs N^zd	Weight
8-Jun	A	1.25	2.1	80000	1	47328.64
9-Jun	B	1	1.4	50000	2	18344.98
9-Jun	C	1	1.6	50000	2	15590.24

The weight for sampled address A is calculated as the total PPS Size times the SSSW, divided by the PPS Size for address A times the number of delivery points sampled on 6/8

= (80000*1.25) / (2.1*1) = 47328.64 (calculation uses unrounded PPS size)

Last Mile Profile Calculation Example

- Step 5: Gather information for each sampled mailpiece, including anticipated delivery date, last mile days, and days left in processing

Anticipated Delivery Date	Delivery Date (D)	Sampled Address (SA)	Actual Sampled MPS		
			Group 1 (Pieces)	Last Mile Days (P)	Days-Left Group (DL)
8-Jun	8-Jun	A	10	0	0
8-Jun	9-Jun	B	8	1	0
8-Jun	9-Jun	C	8	1	1

- This example does not calculate the indicated fields; it assumes the data are available

Last Mile Profile Calculation Example

- Step 6: Calculate the Last Mile Profile by the anticipated delivery day and days left group for each sampling group

Anticipated Delivery Date	Delivery Date (D)	Sampled Address (SA)	Weight	Actual Sampled MPS		
				Group 1 (Pieces)	Last Mile Days (P)	Days-Left Group (DL)
8-Jun	8-Jun	A	47328.64	10	0	0
8-Jun	9-Jun	B	18344.98	8	1	0
8-Jun	9-Jun	C	15590.24	8	1	1

Last Mile Profile (Group, Anticipated Delivery Date, Days-Left Group, Last Mile Day)		Last Mile Profile
Last Mile Profile(1, 8-Jun, 0, 0) =	10*47328.64/(10*47328.64+8*18344.98) =	76.3%
Last Mile Profile(1, 8-Jun, 0, 1) =	8*18344.98/(10*47328.64+8*18344.98) =	23.7%
Last Mile Profile(1, 8-Jun, 1, 1) =	8*15590.24/8*15590.24 =	100.0%

Last Mile profile percentage for 6/8 and 0 days in Last Mile is weighted volume with 0 days in Last Mile, divided by the total weighted volume

Last Mile Profile Calculation Example

- Step 7: Calculate processing volume by anticipated delivery day, days left, and service standard for each sampling group

Anticipated Delivery Date (I)	Group 1 Volume (Vol)	Days-Left (J)	Svc Std
8-Jun	70,000,000	0	3
8-Jun	40,000,000	1	3
Total	110,000,000		

- This example does not calculate processing volumes; it assumes the data are available

Last Mile Profile Calculation Example

- Step 8: Apply the Last Mile profile to the processing volume based on sampling group, days left group, and anticipated delivery date to estimate the volume for each combination of days left and last mile days

Anticipated Delivery Date (I)	Group 1 Volume (Vol)	Days-Left (J)	Days-Left Group (DL)	Svc Std (SG)	Last Mile Days (P)	Last Mile Profile (Based on I & DL)	Est. Volume
8-Jun	70,000,000	0	0	3	0	76.3%	53,431,573
8-Jun	70,000,000	0	0	3	1	23.7%	16,568,427
8-Jun	40,000,000	1	1	3	1	100.0%	40,000,000

Estimated Last Mile volume for 6/8 and 0 days in Last Mile = 76.3% * 70,000,000 = 53,431,573 (calculation uses unrounded Last Mile Profile percentage values)

Last Mile Profile Calculation Example

- Step 9: Calculate the on time performance as the proportion of the estimated volume with days left greater than or equal to last mile days

Anticipated Delivery Date (I)	Group 1 Volume (Vol)	Days-Left (J)	Days-Left Group (DL)	Svc Std (SG)	Last Mile	Last Mile Profile (Based on I & DL)	Est. Volume	P<=J?
8-Jun	70,000,000	0	0	3	0	76.3%	53,431,573	Y
8-Jun	70,000,000	0	0	3	1	23.7%	16,568,427	N
8-Jun	40,000,000	1	1	3	1	100.0%	40,000,000	Y
						On-Time Performance for group 1, subgroup of svc=3, ADD of June 8*:		84.9%

Estimated on-time performance for 6/8

= (53,431,573 + 40,000,000) / (70,000,000 + 40,000,000)

= 84.9%