Containing MLC Costs For Mobile and New Workloads

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Welcome

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  - Consulting on z/OS new features, WLM, performance, Parallel Sysplex, high availability, software asset management, compliance, and optimization, outsourcing contract reviews, and chargeback.
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Mobile Workload Pricing

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What are we going to talk about?

- Understand what IS Mobile Workload Pricing (MWP).
- What are the things you need to consider when evaluating MWP?
- How does MWP impact how you configure your systems?

Introduction to MWP

- First, mobile is not a fad, it is not going away.
  - We know of large z/OS customers where mobile consumes up to 60% of their z/OS capacity.
- IBM (and many others) believe mobile use will continue to grow faster than all other platforms over the next few years. Even if mobile is not a major player on your z/OS systems *now*, it very likely will be in your future.
- This stuff is important to sysprogs because mobile is not 'just another application' – it is very different to what we are used to, and behaves very differently.
- Mobile Workload Pricing (MWP) is an IBM pricing mechanism that is intended to reduce the cost of adding mobile-initiated workloads to z/OS.
  - Important to note that MWP is *primarily* (but not solely) aimed at sites that are re-using *existing* z/OS applications with mobile platforms.

Mobile Workload Pricing

- What *is* Mobile Workload Pricing?
- Headline is that it offers a 60% discount on MSUs consumed by CICS/DB2/IMS/MQ/WAS transactions that originated on a mobile device.
  - 60 … PERCENT … OFF! WOW!

  What else is there to say??
- Quite a bit…

Note: From a technical perspective, the recently-announced z Workload Pricing for Cloud is basically the same as MWP

Introduction to MWP

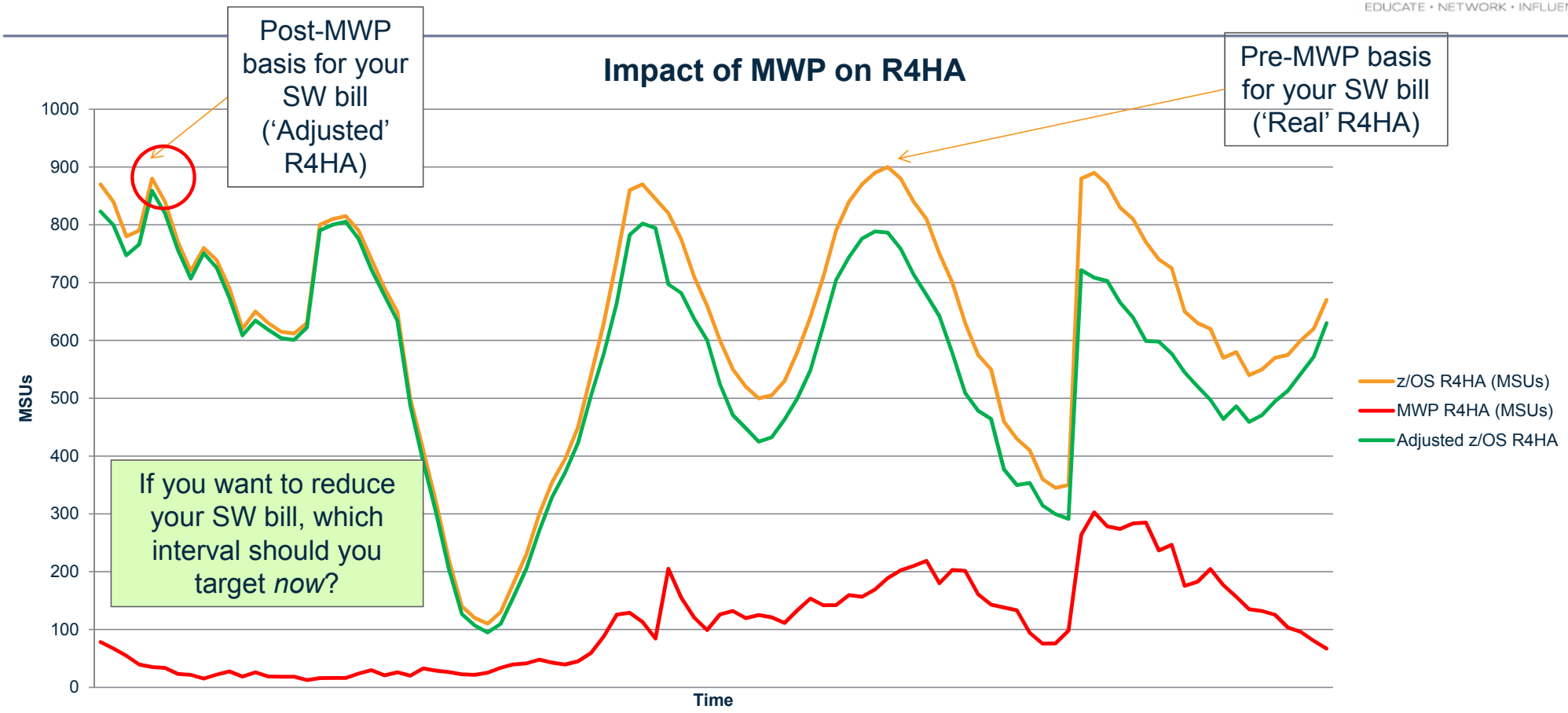
- We believe that MWP is a significant initiative from IBM - it indicates that IBM acknowledges that it must improve the cost-competitiveness of z/OS if customers are to grow and roll out new applications on this platform.
- MWP (together with zCAP, CMP, and zWPC, with more on the way) is aimed at reducing the cost of GROWTH.
  - Depending on how much of your current workload is 'MWP-eligible', AND if that usage aligns with your Peak R4HA, MWP might or might not immediately reduce your SW bills.
  - BUT, signing up for MWP should make it cheaper to *add* mobile workload than if you had not signed up for it.
  - As the percentage of your workload that originated from mobile (and other new workloads) increases over time, at some point the bulk of your work will be priced at the new, more competitive, price points, and your traditional (higher-priced) work will be a decreasing portion of the total work (and cost).
- **THE MESSAGE**: MWP, and *positioning to get the best value from it*, is a long term play. Start thinking about it NOW, even if you have very little mobile work yet.

Introduction to MWP

SHOW ME THE MONEY!

- If you sign up for Mobile Workload Pricing (it is optional, you must sign an agreement and supplements if you want to use it, *and* IBM must approve), IBM will reduce the R4HA for EVERY IBM Sub-Capacity MLC PRODUCT in that LPAR in each interval by 60% of the corresponding R4HA of the CICS, DB2, IMS, MQ, or WAS transactions that originated from a mobile device.
  - An important point here is that it is not only the subsystem where the transaction ran (CICS, for example) that is discounted. It is EVERY sub-capacity IBM MLC product in that LPAR – z/OS, IMS, DB2, PL/1, you name it.

Understanding MWP



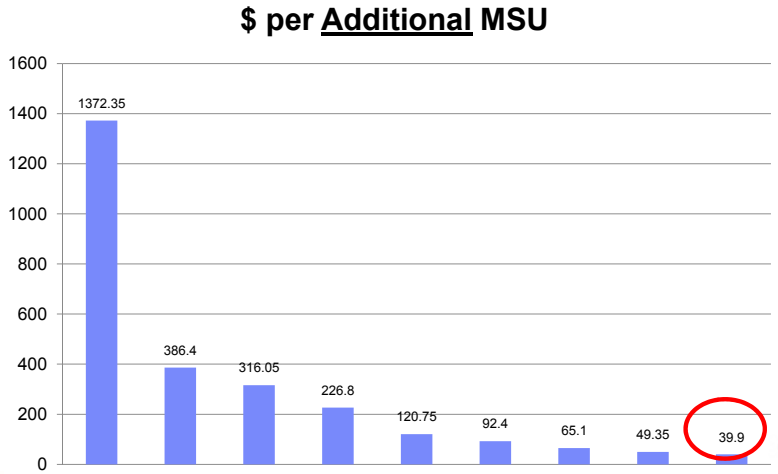
Important points

- The software bill for a product is NOT based on CPU usage of just *that* product, it is based on the R4HA of the LPARs that product runs in. If you add a large CICS application (for example) to an LPAR, the cost of *every* sub-cap product in that LPAR will increase because the overall LPAR CPU consumption will increase.
  - Part of MWP's appeal is that it reduces the size of the increase for *every* sub-cap product, not just for the subsystem used by the mobile application.
- Traditional sub-capacity SW pricing *for each product* is based on the combined **Peak** Rolling 4-Hour Average for every LPAR that product ran in. But with MWP, you now have *two* Rolling 4-Hour Averages – the 'real' one, and the MWP-adjusted one.
  - Traditionally, to reduce your SW bills, you would target the Peak R4HA interval.
  - If you are using MWP, you must target the *MWP-adjusted* R4HA.

Important Points

- Sub-capacity pricing provides a bulk discount for most sub-cap products – meaning that the cost of additional MSUs generally decreases as the total MSU consumption increases.
  - This reduces the average cost/txn as you *grow* – GOOD!
  - When you add a mobile workload *and* you are signed up for MWP, you get a double benefit – bulk discount means that additional MSUs cost less than your average. AND, your Real Rolling 4-Hour Average is reduced by 60% of the R4HA of the mobile workload.

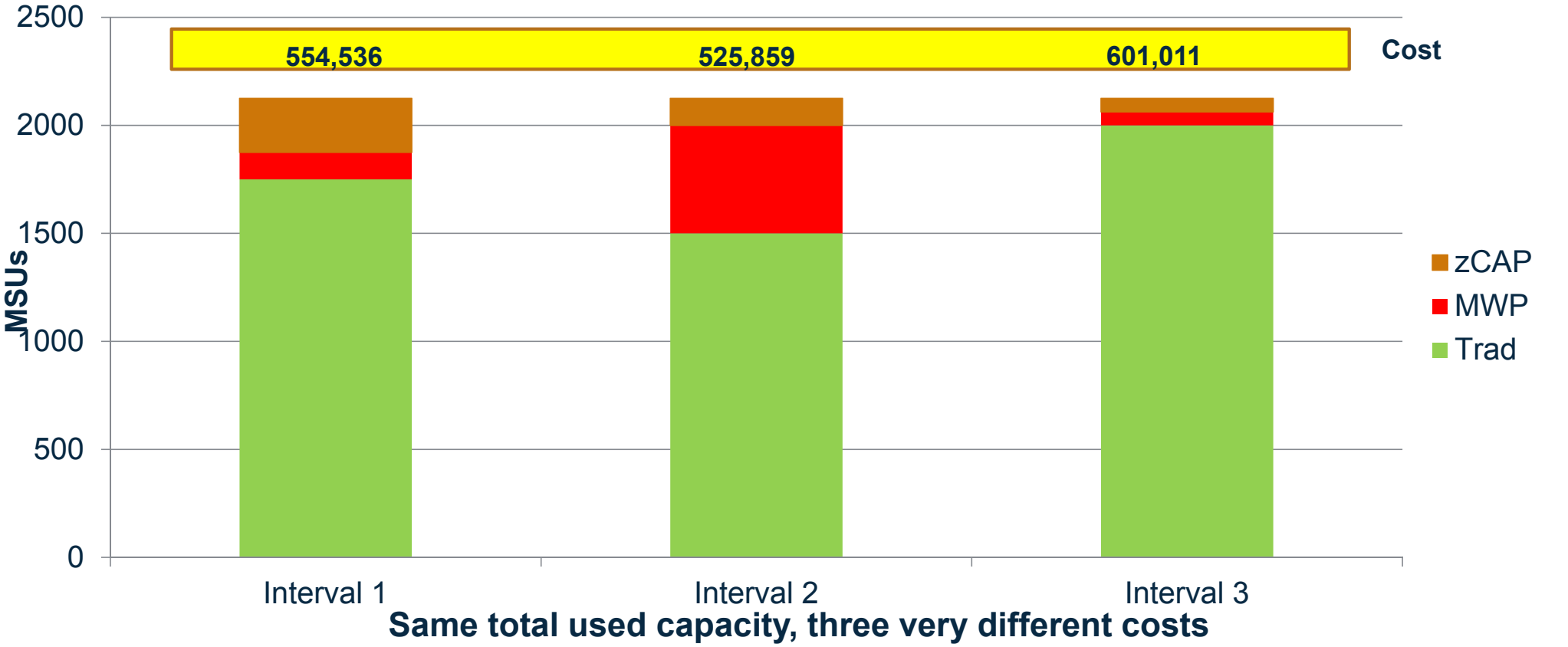
The flip side is that if you *reduce* the consumed MSUs, you are removing the cheapest ones. **So reducing MSUs by xx% will NOT reduce your bill by the same percent.** This indicates that it would make sense to sign up for MWP early rather than waiting until you have a large mobile workload.



Important Points

- Many installations use soft-capping to control their software bills. IT Budgets are specified in terms of Dollars, but soft-caps are specified in terms of MSUs.
  - This is fine when there is a predictable relationship between MSUs and Dollars.
  - But where would you set the cap if the average Dollars per MSU for an LPAR constantly varies, depending on the workload mix at the time?
    - If you set the cap *high*, in the expectation that most of your work will come from mobile, you expose yourself to the risk that traditional work might use most of the capacity, driving up costs.
    - If you set the cap *low*, to protect yourself from exceeding the budget, you might have performance issues because the cap isn't high enough to serve an unexpected blip in mobile transactions.
      - » Because the R4HA is reduced by 60% of the mobile R4HA, you *could* increase the cap without increasing your costs. But what is the right cap that gives you the perfect balance of cost vs. performance?

Relationship between MWP and Capping



Same total used capacity, three very different costs

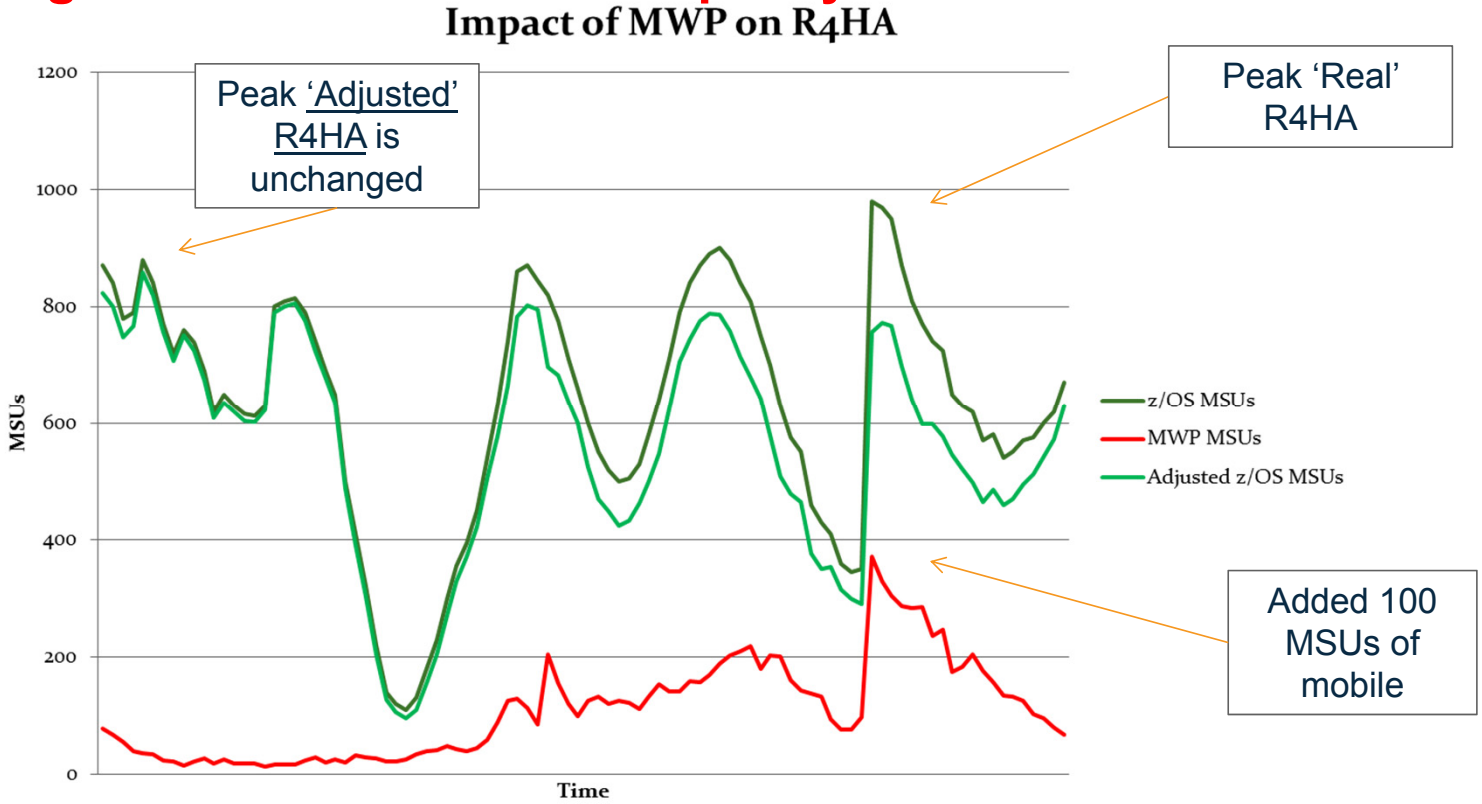
Important Points

- Traditionally, there has been a relationship between your software bill and your CPC utilization – when your CPC utilization increases, your bill would also typically increase.
  - With MWP, there is likely to be a disconnect between actual HW utilization and your SW bills – they might even move in opposite directions.
- And the percent of your total capacity that is used by mobile tends to be less predictable and more variable than your traditional workloads.

- This is the cost of your 'MWP free lunch' – more complex capacity and performance management.

Understanding MWP

How a growing MWP workload could impact you…..



Introduction to MWP

- The positive side of the disconnect between physical utilization and the R4HA that is used to calculate your bill, is that your software bill did *not* increase, despite the fact that your actual utilization increased by 100 MSUs.
  - If you had the same workloads and had not signed up for MWP, your z/OS bill would have increased from the previous peak of 900 MSUs to about 1000 MSUs.

Introduction to MWP

- To sum up so far:
  - Mobile is not a fad, it's not going away.
  - MWP can potentially make it a lot less expensive to handle growing mobile workloads on your z/OS systems.
  - The cost of those financial savings is increased complexity in managing your configuration.
- Next questions are:
  - What qualifies as 'mobile'?
  - How does IBM know how much of my capacity is used by mobile?

What is a ‘mobile device’?

- What is NOT a mobile device?
  - Laptop – even if it is using a web application, or if it is connected using a 3G/4G card.
  - Desktop PC. PC Server. UNIX system. z13 (not even a z13s). 370/138…
- What IS a ‘mobile device’?
  - Smartphone. Even if it initiates a txn using the exact same browser and application as a laptop – if it was initiated from a phone, that is OK, but not if a laptop initiated it.
  - Tablet.
- What else? Handheld stock-taking device? Playstation 3? Fitbit? Your car? Your refrigerator? ASK IBM. Technology is changing so quickly, it is not possible for IBM to provide an up-to-date, comprehensive, list of every device that qualifies. You might find that the lack of a definitive list of qualified devices plays to your advantage.

Managing an environment that has MWP

- How does IBM know the R4HA of your mobile workload? The terms and conditions for MWP specify that:
  - You must use MWRT (an alternative to SCRT) or the new (Fantastic!!) Java version of SCRT (V23 R10 or later).
  - YOU are responsible for providing CPU usage information (CPU seconds for each subsystem) about your mobile workload in a format specified by IBM.
- However, before you dive into your CICS Type 110 SMF records and IMS log records, pause for a minute to consider:
  - How will I identify the subset of transactions that are eligible for MWP?
  - How much capacity (DASD GBs, CPU Secs) will I consume to extract the info I need to input to SCRT/MWRT?
  - How will the method/topology that I select intersect with my soft-capping strategy?

Managing an environment that has MWP

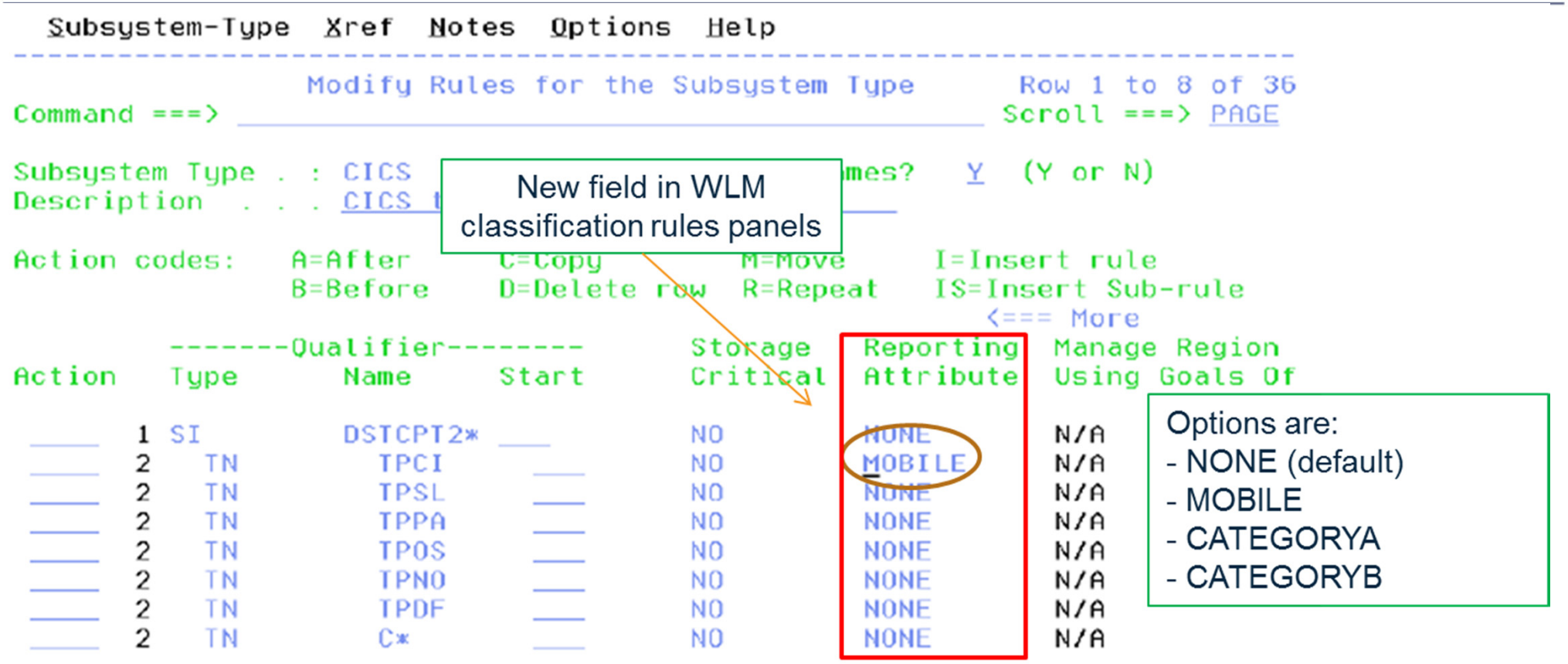
- You basically have 3 options:
  - Run your MWP-eligible transactions in the same regions and subsystems as your traditional workloads.
  - Provide regions and subsystems that are dedicated to MWP-eligible transactions, but that run in shared LPARs.
  - Provide dedicated LPARs for the MWP-eligible transactions.

- We will look at the benefits and drawbacks of each of these, but first, a short diversion…

Workload Manager Support - MWP

- At the end of 2015, IBM delivered a number of enhancements to WLM (and RMF) that are especially of interest to anyone interested in MWP:
  - Additional classification criteria for CICS and IMS, intended to give you more flexibility in identifying transactions that originated on a mobile device.
  - The ability to assign a 'reporting attribute' of NONE (the default), MOBILE, or 2 other categories (CATEGORYA, CATEGORYB) to txns, jobs, STCs, etc.
  - Collection of CPU service unit information (for GP, zIIP, & zAAP) at the service class, reporting class, and system level for each of the 4 categories.
  - *Real time* tracking of Rolling 4-Hour Average for Total, MOBILE, CATEGORYA, and CATEGORYB transactions at the system level.

Workload Manager Support - MWP



Workload Manager Support - MWP

- Prior to this new support, WLM collected transaction response times and transaction counts, *but not CPU times*, at the service class and reporting class level for CICS or IMS transactions.
  - When you install the WLM PTF, you automatically get CPU usage info for CICS and IMS txns in service classes and reporting classes. This is great new capability even if you have no interest in MWP.
- For CICS txns, the service class and reporting attributes are assigned in the region where the transaction arrives (TOR or SOR, for example). That info is in the Performance Block (PB) that is passed to the AOR, FOR, etc.
  - IF you have TORs or SORs that process only MWP-eligible transactions, you could set up an SI CICS classification rule and assign all txns in those regions to MOBILE.
  - And in the STC classification rule, assign the TOR/SOR started task name to MOBILE.
    - If you want to capture the AOR and FOR region CPU time, those regions must also be dedicated.
  - This would result in both the transaction service time AND the region overhead time being assigned to MOBILE.

Workload Manager Support - MWP

- If the expanded set of classification criteria in WLM allow you to identify all or most of your mobile transactions OR if you can direct all your MWP-eligible work to dedicated regions/subsystems, this is a hugely significant enhancement:
  - Would eliminate the need to process huge volumes of transaction-level information to extract the CPU usage information.
  - Would make it possible to determine the MWP-adjusted R4HA for the system in real time – this could then be used by dynamic capping products to determine if the cap should be increased or decreased.

Workload Manager Support - MWP

- WLM obtains CPU time info from:
  - Enclaves, for DDF and WAS
  - Existing SRM-maintained information for other work types (jobs, started tasks, TSO IDs...)
    - For txn server address spaces like CICS or IMS, the region CPU time is the time consumed by those address spaces that is *not* charged to transactions.
  - New, with this new WLM support - CICS and IMS report txn CPU time to WLM when they report the execution or response times. This requires:
    - CICS TS 5.3 (but you do NOT have to enable CICS CMF to gather this info)
      - For more info, see the Redbook *IBM CICS Performance Series: CICS TS for z/OS V5 Performance Report*, SG24-8298
    - IMS V14 with APARs PI46933 and PI51948

Workload Manager Support - MWP

RMF PP Workload Activity Report support:

```
REPORT BY: POLICY=WLMPOL     WORKLOAD=BAT_WKL     SERVICE CLASS=BATHI      RESOURCE GROUP=*NONE
                                                    CRITICAL     =NONE
                                                    DESCRIPTION  =high priority batch

  -TRANSACTIONS-  TRANS-TIME HHH.MM.SS.TTT  --DASD I/O--  ---SERVICE---   SERVICE TIME  ---APPL %---  --PROMOTED--  ----STORAGE----
  AVG       2.80  ACTUAL                 0  SSCHRT   0.0  IOC          0  CPU    6.846  CP     11.52  BLK     0.000  AVG      467.67
  MPL       2.80  EXECUTION              0  RESP     0.0  CPU     561709  SRB    0.001  AAPCP   0.00  ENQ     0.000  TOTAL   1309.90
  ENDED        0  QUEUED                 0  CONN     0.0  MSO     581022  RCT    0.002  IIPCP   0.00  CRM     0.000  SHARED     2.80
  END/S     0.00  R/S AFFIN              0  DISC     0.0  SRB         53  IIT    0.000                LCK     0.000
  #SWAPS     100  INELIGIBLE             0  Q+PEND   0.0  TOT       1143K HST    0.000  AAP      N/A  SUP     0.000  -PAGE-IN RATES-
  EXCTD        0  CONVERSION             0  IOSQ     0.0  /SEC     19228  AAP      N/A  IIP     0.00                 SINGLE       0.0
  AVG ENC   0.00  STD DEV                0                                 IIP    0.000                               BLOCK        0.0
  REM ENC   0.00                                          ABSRPTN  6865                                             SHARED       0.0
  MS ENC    0.00                                          TRX SERV 6864                                             HSP          0.0

  TRANSACTION APPL% :   TOTAL :   CP  11.52   AAP/IIP ON CP   0.00   AAP/IIP   0.00
                        MOBILE :  CP   4.82   AAP/IIP ON CP   0.00   AAP/IIP   0.00
```

Note: CATEGORYA or CATEGORYB are currently not reported by RMF PP

Workload Manager Support - MWP

RMF PP Overview Report support

```
                                R M F   O V E R V I E W   R E P O R T
                                                                                PAGE  001
            z/OS  V2R1              SYSTEM ID FPK2            START 02/26/2016-14.41.35  INTERVAL 00.01.00
                                    RPT VERSION V2R1 RMF      END   02/26/2016-18.22.36  CYCLE 1.000 SECONDS
 NUMBER OF INTERVALS 220          TOTAL LENGTH OF INTERVALS 03.40.00
-DATE     TIME      INT          RR4HA     MOBIL
 MM/DD HH.MM.SS HH.MM.SS
 02/26 14.42.35 00.00.59          21         8
 02/26 14.43.35 00.01.00          21         8
 02/26 14.44.35 00.01.00          21         8
 02/26 14.45.35 00.00.59          21         8
 02/26 14.46.35 00.01.00          21         8
 02/26 14.47.35 00.00.59          21         8
 02/26 14.48.35 00.01.01          21         8
 02/26 14.49.36 00.00.59          21         8
 02/26 14.50.35 00.01.00          21         8
```

System R4HA

MOBILE R4HA

```
//RMFPP     EXEC PGM=ERBRMFPP,REGION=0M
//MFPMSGDS  DD   SYSOUT=*
//*FPINPUT  DD   DSN=CLITHED.SMFJA0.PET,DISP=SHR
//PPOVWREC  DD   DISP=OLD,DSN=KYNEF.RMF.OVIEW
//SYSIN     DD   *
  OVERVIEW(RECORD,REPORT)
  OVW(RR4HA(LACS))
  OVW(MOBIL(LACSM))
  SYSOUT(X)
```

Workload Manager Support - MWP

- Just a little more information about these enhancements:
  - Available for z/OS 2.1 + later.
  - Delivered by APARs OA47042 & OA49728 (WLM) and OA48466 (RMF).
  - Requires CICS TS 5.3 and/or IMS V14 + PTFs. WAS & DDF already provides this info to WLM, so no changes required for WAS or DB2.
  - They do NOT require any changes to your existing Report or Service Class structure.
    - CPU usage information is kept in new fields in WLM.
    - Reported in new fields in SMF Type 70 and 72.3 records. Also in Type 99.2.
    - RMF Postprocessor Workload Activity report and Overview reports enhanced.
    - The info required by MWRT or SCRT is included in the SMF type 70 records – this means that there is NO NEED to create your own input file for those tools IF ALL your MWP-eligible transactions can be identified to WLM.
    - If you would like IBM to add a flag to the CICS 110 SMF records, to indicate which transactions have already been accounted for in WLM, vote for RFE 'MWP enhancement to CICS SMF 110 records', ID 89993.
- And now, back to our 3 options for configuring for MWP…

Considerations for shared regions

- **Benefits**:
  - EASY to set up – just use existing regions and subsystems.
- **Drawbacks**:
  - Transaction-level SMF records do not capture region management time – about **80% is captured**, at best.
  - MQ does not provide transaction-level CPU usage info in its SMF records, so you are limited to collecting whatever MQ charges back to CICS/IMS/etc.
  - Calculating CPU usage in real time is expensive, maybe impossible (unless you can use WLM MWP support).

- **Drawbacks**:
  - If it is not possible to identify MWP-eligible txns to WLM, you MUST process transaction-level SMF data to identify CPU consumption of MWP-eligible transactions. This could be a LOT of data.
  - Identifying the source of the transaction from the SMF records *might* not be possible.
  - How do you identify the original source of transactions that are called by other txns?
  - Maintenance effort for programs that extract CPU usage info is not insignificant – every time a new MWP-eligible application is deployed or modified, you need to update your programs. And not every application will use the same mechanism for identifying where it originated.

Dedicated regions in shared LPARs

- **Benefits**:
  - Because CPU time is obtained from WLM/RMF or Type 30 records, maintenance effort should be a lot lower than if you are gathering this info from transaction-level SMF or log records.
- **Drawbacks**:
  - Requires additional regions/subsystems, meaning more work to set up and manage, plus the resources required for more address spaces.
  - Additional address spaces might reduce CPC cache hit rate, increasing the RNI.
  - Requires data sharing if you want to extend this to database manager.

- **Benefits**:
  - Massive reduction in volume of SMF data to be processed compared to processing txn-level SMF Recs.
  - IBM will allow ALL A.S. CPU time to be discounted – both region-level AND txns (100% instead of 80%).
    - If using WLM MWP support, you can get discount for Txn & region CPU time AND you get real-time MWP R4HA.
    - If not using WLM MWP, IBM will accept data extracted from SMF Type 30
  - Might be easier to identify the transaction source in the network and route it to the dedicated regions – removes the need to identify txn source in WLM classification rules or transaction-level SMF records.

Dedicated LPARs

- **Benefits**:
  - All of the benefits of dedicated regions, plus…
  - Easier to manage LPAR capacity, because nearly all work in the LPAR has the same average price per MSU if you have MWP LPARs and Traditional LPARs.
  - Easier to fence off additional capacity provided for MWP work from traditional workloads.
  - IBM will accept data from just the Type 70 and Type 89 records – no need to collect, keep, and post-process transaction-level or even address space-level SMF records.
  - Could run minimal SW stack to further reduce costs

- **Drawbacks**:
  - Setting up new systems means more work to set up and manage, plus the resources (CPU, DASD, memory) required for more LPARs.
  - Additional LPARs negatively impacts overall CPC cache hit rates (RNI).
  - Requires data sharing, assuming that you want to share data between MWP and traditional applications.
- **Benefits**:
  - There might be security advantages to isolating transactions originating on a mobile device into their own LPARs.

Which topology is right for you?

- There is no one ‘right’ answer for everyone.
  - But the new WLM MWP support gives you a lot more flexibility if you can use it.
- The really important thing is that you make an informed decision based on all the considerations.
- Start working with your subsystem colleagues, network administrators, application architects NOW, to make sure that it is possible to identify the transaction source AND (if possible) to do this in a consistent manner (to reduce the maintenance cost). If you don’t have much mobile yet, GREAT – you can get your architecture agreed and implemented now, rather than having to re-do it all later.
- As soon as you have agreed the mechanics of how you will identify the MWP-eligible transactions, get agreement from IBM to treating that work as MWP.
- If you use (or are considering) a product to manage soft-caps dynamically, talk to the vendor NOW to determine their plans for managing this environment.

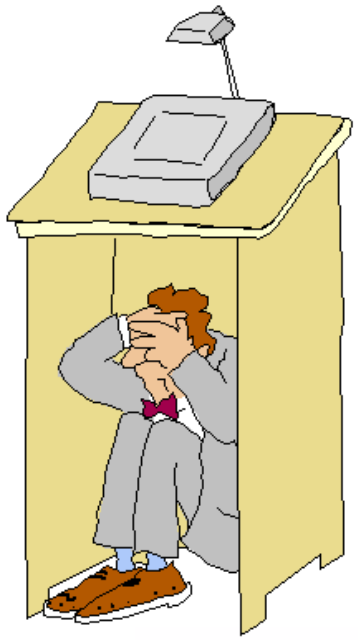
Implementing MWP

- In order to be able to avail of MWP, you must:
  - Have a zBC12/zEC12 or later in your enterprise.
    - The MWP-eligible workloads must run on a z114/z196 or later.
  - Be running z/OS (V1 or V2) and one or more of CICS (V4 or V5), DB2 (V9, V10, or V11), IMS (V11, V12, or V13), MQ (V7 or V8), or WAS (V7 or V8).
  - Be using a sub-capacity pricing option – AWLC, AEWLC, or zNALC.
  - Sign the MWP supplement.
    - Must agree with IBM which applications will be eligible, and how you will gather the usage data for those applications. And, especially, exactly how you will identify the MWP-eligible transactions.
    - Also, any time you add new MWP transactions/applications, you must inform IBM and complete a new supplement.
  - *Provide your own mechanism* to create the MWP input to IBM reporting tool if some MWP-eligible transactions can't be identified to WLM.
  - Use MWRT or SCRT 23.10 or later to report your utilization to IBM.

Other related sessions

- Monday 13:45, Session 19668, *Workload Management (WLM) Update for z/OS V2.2 and z13* by **Andreas Henicke**
- Monday 15:15, Session 19662, *CICS and Workload Manager - Now With Mobile Workload Information!* by **Brad Snyder**
- Thursday 08:30, Session 19877, *The Frank and Cheryl zRoadshow Part 1*
- Friday 10:00, Session 19087, *The Cheryl and Frank zRoadshow Part 2*

Questions?



Thanks!

Thank you for coming along, and please let us know if you have any questions.
Don't forget Cheryl's session at 10:00 tomorrow.

And please remember to complete an evaluation – Session 19098.

Complete your session evaluations online at SHARE.org/Evaluation